

The Adolescent Distress-Eustress Scale:  
Designing, Evaluating, and Utilising a Holistic Measure of Adolescent Stress

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## LIST OF ABBREVIATIONS

Common abbreviations appearing across multiple thesis chapters are as follows:

ADES	Adolescent Distress-Eustress Scale
ADES-D	Distress Subscale of the Adolescent Distress-Eustress Scale
ADES-E	Eustress Subscale of the Adolescent Distress-Eustress Scale
BHS	Blackwood High School
CBT	Cognitive Behavioural Therapy
CFA	Confirmatory Factor Analysis
CPA	Conditional Process Analysis
Cronbach's $\alpha$	Cronbach's coefficient alpha
CTT	Classical Test Theory
DASS	Depression Anxiety Stress Scale
EFA	Exploratory Factor Analysis
FKGLR score	Flesch-Kincaid Grade Level Readability score
HPA axis	Hypothalamicpituitary-adrenal axis
MCFA	Multigroup Confirmatory Factor Analysis
PPI	Positive Psychology Intervention
PTSD	Post-Traumatic Stress Disorder
SAM axis	Sympatheticadrenergic-medullary axis
SME	Subject matter expert
SOC	Sense of coherence
USC	University Senior College

## **ABSTRACT**

Adolescence is characterised by numerous physical, environmental, and psychological transformations. In light of these changes, adolescence is considered to be a crucially stressful period of the lifespan. Clinically, stress has significant impacts on young peoples' physical and mental health, with these early experiences forming the foundation of adult functioning. Adolescence therefore represents a period of both risk and opportunity for clinical psychology.

While stress is often assumed to be inherently maladaptive, current psychological theory outlines that the construct can be delineated into both positive and negative aspects, known as eustress and distress. While research on eustress has grown with the popularisation of Positive Psychology, the concept has received markedly less empirical interest. Correspondingly, the overwhelming majority of measures focus exclusively on distress, discounting the possible positive impacts of stress and perpetuating the lack of research on eustress. As conclusions made on the basis of psychological measurement are only as valid and reliable as the scales used, it is vital that stress measures align with holistic theoretical understandings. However, no existing measure adequately captures both distress and eustress in adolescents. The overarching aim of the current research was to develop a novel measure of the adolescent stress response, which holistically captures both the negative and positive aspects of the construct. This thesis details the series of sequential investigations to design, evaluate, and utilise the Adolescent Distress-Eustress Scale (ADES).

To develop the ADES, distress and eustress were first clearly defined based on a review of the prominent stress theories in the psychological literature. A qualitative approach was taken to operationalise these unobservable constructs, with the thematic analysis of 20 semi-structured interviews revealing several phenomena that could act as

salient indicators of the adolescent stress response. The range of distinctive perspectives demonstrated in this study emphasises the need for research to reflect the unique experiences of adolescents. These findings were next used to generate developmentally-specific scale items, which were then refined to form a cohesive questionnaire through a systematic pre-testing process. Optimising and evaluating the measure in a large, socio-educationally diverse sample ( $N = 981$ ) suggested that the finalised ADES is a brief, psychometrically-sound scale. These results were subsequently replicated in additional adolescent samples.

Finally, the newly-developed scale was used to investigate the role of stress in adolescent wellbeing. One thousand and eighty-one adolescents completed the ADES alongside measures of wellbeing and other relevant psychological and behavioural variables. Conditional process analysis indicated distress had no direct influence on wellbeing, with the observed negative relationship being fully mediated. Contrastingly, eustress was both directly related to increased wellbeing and exerted an indirect effect through relationships with mediating variables. These results suggest stress may be positively leveraged for clinical intervention.

By highlighting the positive aspects of stress, this thesis provides a more balanced approach to research and clinical practice, counteracting the traditional negative focus. As the first adolescent measure to capture both distress and eustress, the ADES serves to bridge the gap between theory and measurement. Overall, results advance theoretical knowledge, insight, and understanding and have clear clinical applications.

## DECLARATION

I certify that this work contains no material which has been accepted for the award of any other degree or diploma in my name, in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission in my name, for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint-award of this degree.

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I also give permission for the digital version of my thesis to be made available on the web, via the University's digital research repository, the Library Search and also through web search engines, unless permission has been granted by the University to restrict access for a period of time.

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## Published Works

Branson, V., Turnbull, D., Dry, M. J., & Palmer, E. (2019). How do young people experience stress? A qualitative investigation of the indicators of distress and eustress in adolescents. *International Journal of Stress Management*, 26, 321-329.  
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Branson, V., Dry, M. J., Palmer, E., & Turnbull, D. (2019). The Adolescent Distress-Eustress Scale: Development and Validation. *SAGE Open*. doi: 10.1177/2158244019865802

Branson, V., Palmer, E., Dry, M. J., & Turnbull, D. (2019). A holistic understanding of the effect of stress on adolescent well-being: A conditional process analysis. *Stress & Health, Advance online publication*. doi: 10.1002/smi.2896

### Conference items

Branson, V., Turnbull, D., Dry, M. J., & Palmer, E. (2017, July). *The Adolescent Distress-Eustress Scale: Developing a holistic measure of adolescent stress*. Paper presented at the 38<sup>th</sup> Stress and Anxiety Research Society Conference, Hong Kong.

Branson, V., Turnbull, D., Dry, M. J., & Palmer, E. (2017, July). *How do young people experience stress? A qualitative investigation of the indicators of distress and eustress in adolescents*. Poster presented at the 38<sup>th</sup> Stress and Anxiety Research Society Conference, Hong Kong.

Branson, V., Turnbull, D., Dry, M. J., & Palmer, E. (2017, September). *How do young people experience stress? A qualitative investigation of the indicators of distress and eustress in adolescents*. Poster presented at the 11<sup>th</sup> Florey Postgraduate Research Conference, Adelaide, Australia.

Branson, V., Dry, M. J., Palmer, E., & Turnbull, D. (2018, September). *The Adolescent Distress-Eustress Scale: Development and validation of a novel stress measure*. Poster presented at the 12<sup>th</sup> Florey Postgraduate Research Conference, Adelaide, Australia.

Branson, V., & Tape, N. (2019, March). *Living a Flourishing, Thriving Life at School: Causes and academic effects of wellbeing in adolescence*. Paper session presented at the Positive Education Schools Association South Australian Chapter State Conference, Adelaide, Australia.

Branson, V., Palmer, E., Dry, M. J., & Turnbull, D. (2019, July). *A positive understanding of the effect of stress on psychological health: The role of eustress in adolescent wellbeing*. Poster presented at the 6<sup>th</sup> World Congress on Positive Psychology, Melbourne, Australia.

Branson, V., Palmer, E., Dry, M. J., & Turnbull, D. (2019, July). *A positive understanding of the effect of stress on psychological health: The role of eustress in adolescent wellbeing*. Poster presented at the 13<sup>th</sup> Florey Postgraduate Research Conference, Adelaide, Australia.

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## THESIS OVERVIEW

The thesis begins by discussing the clinical importance of sound psychometric assessment of adolescent stress and positioning the research within the wider literature. The Introduction chapter concludes with a review of the current measures of adolescent stress, demonstrating that no existing scale adequately captures the construct as it is defined by prominent contemporary models and providing the rationale for the creation of the Adolescent Distress-Eustress Scale. Following this, the theoretical background and overarching methodology of the thesis are described in detail, justifying the analytic procedures and scale development framework. Next six chapters are presented, incorporating three published, peer-reviewed, research papers and three chapters written in narrative style; each chapter sequentially contributes to the overall aim of scale development:

- In Chapter 3, concise definitions of distress and eustress are clearly articulated based on a review and synthesis of the prominent stress theories in the psychological literature.
- Chapter 4 details the qualitative approach used to identify salient, operationalisable indicators of the adolescent stress response (Paper 1).
- Chapter 5 describes the evidence-informed procedures used to translate findings from the literature review and qualitative study into pool of psychometrically-sound scale items.
- Chapter 6 details the methods undertaken to review and refine the item pool and form a cohesive preliminary scale.
- Chapter 7 describes the steps taken to optimise the scale and evaluate its psychometric properties, detailing the initial large-scale evaluation study conducted (Paper 2) and a series of further analyses.

- In Chapter 8 the newly developed Adolescent Distress-Eustress Scale was used to investigate the relationships between distress, eustress, and psychological wellbeing (Paper 3).

The final Discussion chapter synthesises the thesis results, discusses the clinical implications of the findings, acknowledges the strengths and limitations of the work, and provides suggestions for future research.

Data collection for the thesis was conducted in Adelaide, the capital city of the state of South Australia, Australia. References and Appendices for all chapters are collected at the end of the thesis. Research papers are presented in manuscript format, with the same typeset as the main body of the thesis, and preceded by preambles situating them with regard to overall aims and outlining any relevant theoretical background and/or methodology that was not detailed in the submitted paper. Any content published with the papers as online supplemental material is included as an Appendix. Table and figure numbers are continuous throughout the document. Acronyms are spelt out in full on first use and in section headings; frequently used acronyms are included in the List of Abbreviations on p. xi.

## **CHAPTER 1. INTRODUCTION**

This Combined PhD/Master of Psychology (Clinical) research considers the role of stress in healthy adolescent development and the clinical importance of sound psychometric evaluation of the construct. The thesis details the series of investigations conducted in South Australia to design, evaluate, and utilise the Adolescent Distress-Eustress Scale (ADES). This novel measure aligns with the holistic understanding of stress accepted within the psychological literature.

This introductory chapter begins by briefly defining stress. Next, the clinical relevance of adolescent stress is discussed, paying particular attention to the increased pressure young people face, the resultant effects on health and functioning, and the opportunities for psychological intervention. The critical importance of measurement for research and clinical practice is also considered. Finally, a review of the psychological literature demonstrates that no existing measures adequately capture adolescent stress as it is defined by prominent contemporary models, providing the rationale for the creation of a theoretically- and psychometrically-sound scale.

### **1.1 Brief Definition of Stress**

There is little consensus across the psychological literature as to an established and widely-accepted definition of stress (e.g. Burton & Hinton, 2010; Le Fevre, Matheny, & Kolt, 2003). While traditional assumptions tend to conceptualise stress as dysfunctional and detrimental, contemporary theory suggests stress is not inherently maladaptive. For the purposes of this research, stress is defined as an individuals' response to a demanding stimulus, or 'stressor'. Current psychological theory (e.g. Lazarus & Folkman, 1987; Nelson & Simmons, 2003) posits that stressors have no inherent valence, meaning an individual's experience of stress depends on their appraisal

of the demand. The resultant response is differentiated into distress, the negative, undesirable, and harmful response to a stressor, and eustress, the positive, desirable, and advantageous response to a stressor. These two responses are considered distinct constructs, rather than extremes on a continuum. These definitions are based on a synthesis of the current psychological literature and will be expanded on and justified in Chapter 3.

## **1.2 The Clinical Relevance of Stress in Adolescence**

Adolescence is commonly defined as the transitional period between childhood and adulthood, “characterised by accelerated processes of change in physical, cognitive, and psychosocial functioning” (Cicognani, 2011, p. 559). The age boundaries of adolescence are imprecise, as no single biopsychosocial, behavioural, or cultural event signals its start or end, and consequently various, somewhat arbitrary, definitions exist in the literature (Spear, 2000). For the current thesis, adolescence is defined as the period between 12 and 20 years old. This age range was chosen as it aligns with the definition of adolescence used in the South Australian Youth Mental Health Survey (Venning, Elliott, Kettler, & Wilson, 2013), allowing for the potential comparison of current results with previous Australian mental health research.

Adolescence is associated with a range of biological and cognitive changes, including the experience of puberty and sexual maturation, a rapid ‘growth spurt’ in height and weight, and increased capacity for abstract thinking, deductive reasoning, and metacognition (e.g. Bergman & Scott, 2001; Booth, Granger, & Shirtcliff, 2008; Lupien, McEwen, Gunnar, & Heim, 2009; Spear, 2000). These changes have significant impacts on social, emotional, and behavioural functioning, promoting “increasingly complex and sophisticated ways of relating to *[the]* world *[...and having]* dramatic effects on the ways

in which adolescents perceive, understand, and interpret their daily experiences” (Bluth & Blanton, 2015, p. 219). In particular, adolescence is characterised by: identity development, including growth in self-concept, self-esteem, and self-efficacy; increased autonomy and independence, particularly from parents; changing social networks, with great importance placed on peer relations; a transition to mature sexuality and intimate relationships; and, increased risk-taking (e.g. Bergman & Scott, 2001; Booth et al., 2008; Brand et al., 2014; Spear, 2000). Adolescence is also marked by an increase in societal responsibility associated with approaching adulthood, such as educational, vocational, and financial obligations and changing legal rights and accountability (e.g. Brand et al., 2014).

In light of these rapid and substantial changes, adolescence is considered to be a crucially stressful period of the lifespan (e.g. Kriščiūnaitė & Kern, 2014; Moksnes, Løhre, Lillefjell, Byrne, & Haugan, 2014; Venning et al., 2013). Societal and global factors differentially impacting on young people further contribute to this stress, including the inequitably high youth unemployment rate (Thomas & Gilfillan, 2019) and consideration of a future of increasing environmental degradation (Waters, 2011). In addition to these unique and developmentally-specific demands, young people must also confront normative pressures, such as socioeconomic hardship or family conflict (e.g. Vera et al., 2012), and approximately 25% of adolescents have also experienced at least one potentially traumatic stressful event, such as the death of a family member (Kriščiūnaitė & Kern, 2014). Empirically, large-scale research suggests that stressful life events increase sharply from age 12 (Aldwin, 2011), with stress peaking in adolescence and steeply declining from the early 20s onwards (Ksobiech, Chiao, & Yi, 2014; Stone, Schwartz, Broderick, & Deaton, 2010). Compounding this issue, experimental and longitudinal studies indicate that adolescents have a heightened hormonal and physiological

response to demanding stressors, suggesting their brains are particularly sensitive and vulnerable to the impact of stress (e.g. Lupien et al., 2009; Nagel, 2008; Spear, 2000).

Recognising this significance, a recent national survey found that 'coping with stress' was the number one personal concern of the almost 30,000 young Australian participants (Carlisle et al., 2018). 43.1% of respondents in this survey indicated that they were either 'extremely' or 'very' concerned about their ability to cope with stress, with only 15.3% not concerned at all by this issue. This nationwide survey is conducted annually and these recent results replicate those found in previous years (e.g. Bailey et al., 2016; Bullo, Cave, Fildes, Hall, & Plummer, 2017).

### **1.2.1 The Effect of Stress on Adolescent Health and Functioning**

Cogent with traditional assumptions that stress is inherently dysfunctional, the overwhelming majority of existing research has focussed on its harmful and deleterious effects on physical and mental health (e.g. Little, Simmons, & Nelson, 2007). However, a growing body of literature suggests that exposure to demanding stressors can have profoundly positive effects on health and functioning. In the sections below, the biological, psychological, and behavioural effects of stress are examined, collating results from the vast empirical literature of cross-sectional, longitudinal, experimental, and qualitative studies and review papers. The majority of this existing research has used a self-report, correlational design and has been conducted in Western cultures and should thus be considered within these contexts.

It is important to note that the effects described below are highly influenced by individual differences and not all people will respond to stressful life events in the same way (e.g. Larson & Moses, 2014; Vera et al., 2012). However, the ubiquity of effect on key domains of individual functioning highlights the importance for clinical practice of

researching, understanding, and intervening to manage stress (e.g. Byrne, Davenport, & Mazanov, 2007).

### **1.2.1.1 *Physiological effects of stress***

An in-depth description of the cascade of biological events associated with stress is beyond the scope of this psychologically focussed thesis. However, briefly, exposure to a stressor leads to the activation of two biological pathways: the sympatheticadrenenergic-medullary (SAM) axis and the hypothalamicpituitary-adrenal (HPA) axis. The SAM axis is activated within seconds of stressor exposure and “concerns immediate sympathetic activation preparing an individual to deal with a stressor, resulting in for example increased heart rate ... and blood pressure ... and release of catecholamines such as epinephrine and norepinephrine” (De Vente, Olff, Van Amsterdam, Kamphuis, & Emmelkamp, 2003, p. 54). The HPA axis is the “slower response system involving release of corticosteroids such as corticotropin releasing hormone, adrenocorticotrophic hormone, and cortisol” (De Vente et al., 2003, p. 54). Broadly the SAM axis can be conceptualised as ‘acute’ and the HPA axis as ‘chronic’, however, the two systems exert mutual control on one another (e.g. De Vente et al., 2003; Van Reeth et al., 2000). Biologically, there are differing sex-related hormonal and neurobiological responses to environmental threat, with males found to have greater acute HPA responses than females (e.g. Verma, Balhara, & Gupta, 2011).

Biological changes associated with the activation of the SAM and HPA axes result in a number of physiologically relevant effects including “mobilization of energy ... from storage nutrients ... increase in cardiovascular/pulmonary tone to facilitate tissue delivery of oxygen and glucose, slowing down of anabolic processes ... and suppression of digestion, growth, reproduction, inflammatory responses” (Van Reeth et al., 2000, p. 202). This response helps to prepare the body for the actions required to respond to the

demanding situation and is associated with enhanced physical performance and immunopreparatory changes (Aldwin & Stokols, 1988; Dhabhar, 2018; Menicucci et al., 2013). Cognitively, there is a narrowing of attention and enhancement of memory as well as an acute, short-term, increase in flexibility and adaptability of thinking (e.g. Aldwin & Stokols, 1988; Meir Drexler & Wolf, 2017; Pakenham & Stafford-Brown, 2012).

Evolutionary, these effects are fundamentally adaptive, allowing the individual to successfully manage threatening environmental demands and thereby improving chances of survival (Compas, 1987a; Dhabhar, 2018; Ramesh Bhat, Sameer, & Ganaraja, 2012; Van Reeth et al., 2000). However, if activation is prolonged and/or uncontrollable, a number of negative effects may result (e.g. Egger & Reznik, 2017; Van Reeth et al., 2000), summarised in Table 1. As individuals experiencing negative physiological functioning are often exposed to more life change and therefore more stressors, these effects may act to create further stress (Sarason, Johnson, & Siegel, 1978).



Table 1

*Negative Physiological Effects Associated with Prolonged and/or Uncontrollable**Activation of the SAM and HPA Axes*

Effect	References
Decreased neuroendocrine functioning and immunocompetence	(Aldwin & Stokols, 1988; Healey, 2002)
Physical illness	(de Anda et al., 2000; Dhabhar, 2018; Healey, 2002; Michell, 1997; Sarason et al., 1978)
Morbidity	(Crum, Salovey, & Achor, 2013; J. R. Edwards & Cooper, 1988)
Pain e.g. headaches, abdominal pain, muscle pain	(de Anda et al., 2000; Egger & Reznik, 2017; Frame & Reichin, 2019; M. C. Jones & Johnston, 2000; Rice, 1999; Sheu, Lin, & Hwang, 2002; Vacek, Coyle, & Vera, 2010)
Worsening of existing physical health conditions	(Sococco, Rapattoni, & Fantoni, 2006)
Poor quality sleep	(e.g. Chung & Cheung, 2008)
Visceral obesity	(Egger & Reznik, 2017)
Oxidative damage of ribonucleic acid, accelerating biological ageing	(Aschbacher et al., 2013)
Fatigue and exhaustion	(Rice, 1999; Van Laethem, Beckers, Dijksterhuis, & Geurts, 2016)
Cognitive impairment	(Crum, Akinola, Martin, & Fath, 2017; Crum et al., 2013; Frame & Reichin, 2019; Michell, 1997)
Impairment of declarative memory	(Meir Drexler & Wolf, 2017; Pakenham & Stafford-Brown, 2012)

Although the physiological impact of stress is separated here from psychological and behavioural effects, all three are interrelated and mutually influence one another (Michell, 1997). The physiological changes described above affect an individual's psychology, mental health, and behaviour, which likewise feedback into further physiological change (e.g. Meir Drexler & Wolf, 2017).

### ***1.2.1.2 Effect of stress on psychological health***

While it tends to be assumed that stress invariably predicts psychopathology, empirical results are mixed (e.g. Anderson & Arnoult, 1989; Grant, Compas, Thurm, McMahon, & Gipson, 2004). The clinical literature reveals stress has both negative and positive impacts on mental health, as outlined below.

#### ***1.2.1.2.1 Negative effects of stress on psychological health***

Exposure to demanding stressors has been empirically associated with a range of negative mental health outcomes, including: emotional maladjustment and uneasiness (Jarinto, 2011; Swearingen & Cohen, 1985b); motivational deficits (Aldwin & Stokols, 1988); increased anger (Sham, 2014; Sheu et al., 2002); internalising behaviours (K. J. Kim, Conger, Elder, & Lorenz, 2003); and general psychological distress (Swearingen & Cohen, 1985a). Further, increased stress has consistently been found to predict non-clinical symptoms of anxiety and depression (e.g. Carter, Dellucci, Turek, & Mir, 2015; Coyle & Vera, 2013; Pakenham & Stafford-Brown, 2012; Spear, 2000). Stress has also been reported to increase hopelessness, suicidal ideation, and risk of death by suicide (e.g. Byrne et al., 2007; Coyle & Vera, 2013; Crum et al., 2013; de Anda et al., 2000; Kelley & Lowe, 2012; Rowley, Roesch, Jurica, & Vaughn, 2005).

The current edition of the Diagnostic and Statistical Manual of Mental Disorders<sup>1</sup>

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<sup>1</sup> In Australian psychological practice, this is the most commonly utilised diagnostic system.

(DSM-5; American Psychiatric Association, 2013) allocates a chapter to 'Trauma- and Stressor-Related Disorders'. These disorders explicitly list exposure to a stressful event as a diagnostic criterion and are characterised by predominantly anxiety- and fear-based symptoms, although there may also be aspects of anhedonia and dysphoric mood, externalising symptoms, and/or dissociative symptoms (American Psychiatric Association, 2013). The majority of Stressor-Related Disorders are relatively rare, with post-traumatic stress disorder (PTSD) and adjustment disorder being the most common. Both PTSD and adjustment disorders are characterised by the development of clinically significant symptoms following exposure to an identifiable stressor and are associated with significant subjective distress, functional impairment, changes in social relationships, and increased suicide risk (see for diagnostic criteria: American Psychiatric Association, 2013). In addition to the specific stressor-related disorders, the DSM-5 includes stress as a risk factor for multiple other diagnosable disorders, including schizophrenia, depressive disorders (e.g. major depressive disorder), anxiety disorders (e.g. social anxiety disorder, panic disorder, and agoraphobia), obsessive-compulsive disorder, somatic symptom disorders (e.g. illness anxiety disorder), and eating disorders (e.g. anorexia nervosa, bulimia nervosa), and it is also noted to exacerbate symptoms of neurodevelopmental, dissociative, and personality disorders. Moreover, stress has been found to interfere with the success of psychotherapeutic treatment for these disorders (Pendleton et al., 2001).

The other key diagnostic classification system, the International Statistical Classification of Diseases and Related Health Problems<sup>2</sup> (ICD-11; World Health Organization, 2018), similarly includes diagnostic criteria for 'Disorders specifically

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<sup>2</sup> In Australian psychological practice, the ICD-11 is only infrequently used, although it may offer clinicians an alternative perspective.

associated with stress', including PTSD and Adjustment Disorder. However, the ICD-11 also includes diagnostic criteria for the stress-related syndrome 'burn-out'. This condition is conceptualised as resulting from chronic workplace stress and characterised by: 1) feelings of energy depletion/exhaustion; 2) increased mental distance or feelings of negativism/cynicism related to one's job; and 3) reduced professional efficacy. While this condition is not recognised by the DSM-5, it has been widely researched in the organisational literature and has long been seen as a syndrome of clinical importance (e.g. Hamama, Ronen, Shachar, & Rosenbaum, 2013; Little et al., 2007; Otero-Lopez, Villardefrancos, Castro, & Santiago, 2014; Pakenham & Stafford-Brown, 2012; Z. Wang et al., 2017). Burn-out is suggested to contribute to functional impairment at work, subjective distress, and psychosomatic symptoms including fatigue and gastrointestinal upset (Little et al., 2007).

#### *1.2.1.2.2 Positive effects of stress on psychological health*

While stress has been associated with the variety of negative outcomes for mental health described above, empirical literature reveals it may also have a profoundly positive effect on psychological functioning. Empirical research suggests that exposure to demanding stressors contributes to personal growth, including increased self-reliance, greater appreciation for life, and recognition of new possibilities (J. Kim, Sun, & Heo, 2014; McGowan, Gardner, & Fletcher, 2006; Ramesh Bhat et al., 2012; Skinner & Brewer, 2002). Stress has also been associated with increased self-efficacy (e.g. J. R. Edwards & Cooper, 1988), satisfaction and engagement with work (Kozusznik, Rodríguez, & Peiró, 2015); experiences of flow (Egger & Reznik, 2017; Mesurado, Richaud, & Mateo, 2015); a sense of mastery (Skinner & Brewer, 2002); and increased creativity (Hon, Chan, & Lu, 2013). Further, increased adversity during childhood has been suggested to improve long term outcomes. For example, it has been reported that historically middle-class children

who experienced deprivation during the depression were more responsible and achievement-motivated when compared to non-deprived peers (see Aldwin & Stokols, 1988). Finally, it has been found that effectively coping with and managing pressure engenders an increased sense of competence, self-esteem, and resilience (Aldwin & Stokols, 1988; Larson & Moses, 2014; Skinner & Brewer, 2002; Tousekova et al., 2018).

### ***1.2.1.3 Impact of stress on behaviour***

As with psychological functioning, stress is suggested to differentially impact on individuals' behaviour. Negatively, increased pressure is associated with poor decision making (Cilliers & Flotman, 2016; Pakenham & Stafford-Brown, 2012; Rice, 1999) and this is suggested to increase risky and unhealthy behaviours (Aronowitz, 2005; Kelley & Lowe, 2012; Vacek et al., 2010). For example, stress has been reported to be associated with smoking, drinking, and drug use (Aronowitz, 2005; Byrne et al., 2007; Glozah & Pevalin, 2014; Rowley et al., 2005; Sheu et al., 2002; Vera et al., 2012), risky sexual behaviour (Aronowitz, 2005; Vacek et al., 2010), delinquency (Vacek et al., 2010), poor diet (Austin, Smith, & Patterson, 2009), and compulsive buying (Roberts & Roberts, 2012).

Much of the research concerning the behavioural impacts of stress has been conducted within the field of organisational psychology. In this context, stress is associated with absenteeism from work and school and has been shown to influence work turnover and school drop-out rates (e.g. Crum et al., 2013; Currid, 2008; Simmons, Nelson, & Neal, 2001). Evidence for the relationship between stress and occupational/academic functioning is inconsistent (Cavanaugh, Boswell, Roehling, & Boudreau, 2000), with some studies finding that being under pressure improves performance (e.g. F. Jones & Bright, 2001b; McGowan et al., 2006; Strack, Lopes, Esteves, & Fernandez-Berrocal, 2017) and others suggesting it decreases performance (Hon et al.,

2013). In adolescents, increased stress has been associated with productivity and greater ability to successfully complete assignments and exams (O'Sullivan, 2011).

Socially, increased stress has been found to predict relational conflict (Crum et al., 2013; M. C. Jones & Johnston, 2000; Simmons et al., 2001), bullying and stigmatisation (Aldwin & Stokols, 1988), and aggression and irritability towards others (e.g. Crum et al., 2013; Rice, 1999; Sham, 2014). However, exposure to adversity has also been shown to increase interpersonal co-operation and cohesion and be associated with greater levels of social interaction (Aldwin & Stokols, 1988; Schoenfeld & Loving, 2013).

### **1.2.2 Clinical Intervention and Stress Management in Adolescence**

Substantial research has shown that adolescence is a critical developmental period for long-term mental health, with early experiences forming the foundation of functioning into adulthood (e.g. Bergman & Scott, 2001; National Scientific Council on the Developing Child, 2004; Venning et al., 2013; Wilkinson-Lee, Zhang, Nuno, & Wilhelm, 2011). As young people develop, their “early emotional experiences literally become embedded in the architecture of their brain” (National Scientific Council on the Developing Child, 2004, p. 1). As a result, while individuals continue to develop, early experiences may have a more pervasive impact on current functioning than the events actually occurring during adulthood (e.g. Compas, 1987b). In particular, chronic exposure to stress during adolescence has been shown to be associated with long-term impacts on those regions of the brain involved in cognition and mental health (see Lupien et al., 2009). Further, the psychosocial and behavioural habits developed during this period are suggested to continue through adulthood (Booker et al., 2008; Carter et al., 2015).

Mid-to-late adolescence is the typical age of onset for many common diagnosable mental health disorders (e.g. depression and anxiety; see for example, international epidemiological review: Kessler et al., 2007). Considering the most recent Australian

statistics available, 14% of young people aged between 4 and 17 (Lawrence et al., 2015) and approximately 25% of those aged between 15 and 24 (Australian Bureau of Statistics, 2019) had experienced a mental illness in the previous 12 months. Further, Australians aged between 18 and 24 have the highest prevalence of mental illness than any other age group (Australian Bureau of Statistics, 2019) and suicide is the leading cause of death for those aged between 15 and 44 (Australian Institute of Health and Welfare, 2017). As mental ill health interferes with biopsychosocial developmental processes, emotional and psychological disorders in adolescence increase the potential for both short- and long-term negative outcomes (Bluth & Blanton, 2015; Wilkinson-Lee et al., 2011). Clinical intervention during adolescence therefore has benefits both for improving current mental health and for laying a positive foundation for sustained functioning in adulthood (e.g. Venning et al., 2013). As a consequence, adolescence is targeted as a critical period for clinical intervention (e.g. Compas, 1987b).

Successfully navigating adolescence requires the acquisition of skills necessary to manage the increased stress and development of protective factors for mental health (Carter et al., 2015; Spear, 2000; Venning et al., 2013; Waters, 2011). Numerous resources exist outlining evidence-based clinical stress management interventions and there are several treatment manuals focussing specifically on stress-related mental health disorders (see for examples: Egger & Reznik, 2017; Kabat-Zinn, 2005; J. C. Smith, 2002). Reviewing these resources suggests that clinical stress management is generally informed by third wave Cognitive Behavioural Therapy (CBT), which focusses “more on the person’s relationship to thought and emotion than on their content” (S. C. Hayes & Hofmann, 2017, p. 245) and highlights mindfulness and acceptance strategies. Stress management interventions within this approach commonly involve: psychoeducation on stress; identifying and problem solving ways of removing/modifying stressors; cognitive

restructuring (e.g. identifying and modifying negative automatic thoughts); behavioural exposure and desensitisation; relaxation and mindfulness skills training; and engineering increased social support (e.g. Egger & Reznik, 2017; Pakenham & Stafford-Brown, 2012; J. C. Smith, 2002).

In general, clinical psychological practice conforms to the assumption that ‘stress’ is inherently dysfunctional and intervention has traditionally focussed on mitigating negative stress-related consequences. For example, J. C. Smith’s (2002) ‘Comprehensive Handbook’ on stress management, recommended in the Australian Psychological Society periodical as best practice in treating Adjustment Disorders (Kenardy, 2014), tellingly contains only a one-sentence reference to eustress. By adhering to this entirely negatively focussed understanding of the construct, intervention overlooks any potential for increasing and bolstering the positive outcomes associated with stress. The field may therefore benefit from a more balanced approach to stress management, which both mitigates negative consequences and promotes positive consequences.

### **1.3 Measuring Adolescent Stress**

Measurement is a critical, fundamental activity in all science, including the behavioural, social, and psychological sciences. As outlined by DeVellis (2012): “We acquire knowledge about people, objects, events and processes by observing them. Making sense of these observations frequently requires that we quantify them” (p. 2). This is particularly relevant for psychology, where the variables of interest are largely impossible to directly observe. Hypothesis testing in empirical psychological research therefore relies on measurement to allow for the investigation of relationships between unobserved constructs (e.g. Cronbach & Meehl, 1955). Measurement is also essential in clinical practice as “what we measure affects what we do” (Stiglitz, Sen, & Fitoussi, 2009,



p. 7). In therapeutic settings, psychological measures are used to aid in diagnostic clarity and to monitor client progress, allowing clinicians to adjust their practice accordingly (e.g. Seidel, Andrews, Owen, Miller, & Buccino, 2016). Similarly measurement aids in the establishment of individualised and effective population-scale psychological interventions by providing insight into the needs of the particular group and quantifying the extent to which a program is meeting its objectives (e.g. Huppert & So, 2013). Recognising the essentiality of measurement in clinical practice, ‘psychological assessment and measurement’ is included as a core competency requirement for Clinical Psychologists in Australia (Psychology Board of Australia, 2019).

As the conclusions made on the basis of measurement are only as good as the measures used to operationalise the constructs of interest, the development of high-quality scales is vital for research and practice (Cronbach & Meehl, 1955; DeVellis, 2012; Michell, 1997). It is well established in the literature that a high quality measure must meet at least two key criteria: reliability and validity (e.g. Compas, 1987b; DeVellis, 2012). Reliability refers to “the proportion of variance in a measure that can be ascribed to a characteristic or common theme shared by the individual items” (DeVellis, 2006, p. 54) while validity is concerned with whether this common characteristic is actually the construct the scale is intending to measure (DeVellis, 2006). The Australian Psychological Society’s (2016) best practice guidelines for psychological testing outline that in addition to demonstrating reliability and validity, gold-standard psychological instruments meet five additional standards: 1) are based on a test theory; 2) draw on psychological theory; 3) have an explicit empirical mechanism for interpreting scores; 4) require standardised administration and scoring; and 5) allow inferences to be drawn about underlying

attributes of the test-takers<sup>3</sup>. Using poor measures that do not adhere to these criteria and where the relationship between the quantifiable scale and the unobservable construct of interest is weak, leads to flawed inferences and impedes research and clinical practice (e.g. Burton & Hinton, 2010; DeVellis, 2012).

### **1.3.1 Current Measures of Stress: Literature Review**

There is no standardised methodology for the assessment of adolescent stress (e.g. De Vriendt et al., 2011). In response to the lack of a standard, reliable, well-validated, and theoretically-sound measures, researchers have often created idiosyncratic scales to suit the specific population and context of their study. This has resulted in a proliferation of stress measures of variable quality (Burnett & Fanshawe, 1997). In the sections below, a review of the literature is presented, critically analysing the available measures of adolescent stress.

From a physiological point of view, stress may be measured via objective biological manifestations of SAM and HPA axes activation (Milsom, 1985), including salivary cortisol (Aschbacher et al., 2013; De Vriendt et al., 2011; Schoenfeld & Loving, 2013; S. G. Williams, Turner-Henson, Langhinrichsen-Rohling, & Azuero, 2017), blood glucose (Stanton, Campbell, & Loving, 2014), heart rate and blood pressure (e.g. De Vente et al., 2003; Ramesh Bhat et al., 2012; Yamaguchi et al., 2004), and salivary amylase (De Vriendt et al., 2011; Yamaguchi et al., 2004). However, these physiological indicators are largely misaligned and inconsistent with individuals' self-reported psychological perceptions of stress (F. Jones & Kinman, 2001) and experimental evidence suggests there is little difference in the biological manifestation of distress and eustress

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<sup>3</sup> These guidelines were proposed with formalised psychological instruments such as cognitive ability (IQ) testing in mind, however, they provide a framework for considering the features required of a good quality self-report measure.

(Rietveld & van Beest, 2007; Schoenfeld & Loving, 2013). Further, biological measurement is confounded by additional factors influencing SAM and HPA axes activation, including age and genetic tendencies (F. Jones & Kinman, 2001).

Given the limitations of biological indicators, self-report, psychological measures are considered the “method of choice in measuring adolescent stress” (Byrne et al., 2007, p. 395) and most relevant for clinical practice. However, there is an epistemological divide in the psychological literature as to whether stress is best measured in terms of the experience of objective, environmental stressors, the subjective appraisal of those demands, or some sort of interaction between the two (D. Bartlett, 1998; F. Jones & Kinman, 2001; Lazarus, 1990; Mullis, Youngs, Mullis, & Rathge, 1993; Muse, Harris, & Feild, 2003; Rudolph & Hammen, 1999). With this debate in mind, there are three main measurement approaches in the literature: 1) the stimulus approach, focussing on stressors; 2) the response approach, focussing on the stress response; and, 3) the stimulus-response approach, which considers the interaction between the two (see F. Jones & Kinman, 2001 for an accessible overview; also D. Bartlett, 1998). Reviewing each of these approaches below, justification is provided for the use of the response approach in the current thesis. However, it is important to note that each of these measurement methods has utility in different contexts and are not at odds with one another; ‘stress’ is a complex, multivariate process and ideally good quality scales would be available within all three approaches (Lazarus, 1990).

#### ***1.3.1.1 Stimulus approach to stress measurement***

In the stimulus approach, ‘stress’ is defined simply as an individual’s exposure to environmental stressors. As such, the greater the number of demanding life events an individual experiences, the greater their assumed level of ‘stress’ (Carter et al., 2015; Mullis et al., 1993). The primary method of measurement within this approach presents

respondents with a list of demanding events and asks them to indicate whether they have been exposed to these potential stressors within a certain time frame (De Vriendt et al., 2011; F. Jones & Kinman, 2001; Rudolph et al., 2000). Measures can broadly be separated into two categories: 1) checklists that capture a simple tally of the total number of events experienced by the respondent; and 2) inventories that assign a 'life change' score to each event based on the average impact of the event on a person's life. In general, scales that assign life change scores are better predictors of psychosocial outcomes than are simple checklists, however this difference is small (S. Cohen, Kamarck, & Mermelstein, 1983).

As the events considered to be relevant stressors differs according to the population and research context of interest, copious stimulus-oriented measures exist in the literature (Byrne et al., 2007; Grant et al., 2004) and a full review of all existing scales is beyond the scope of the current thesis. With regard to adolescent stress, stimulus-oriented measures used in youth populations have largely been modelled on adult scales. It is argued that this discounts unique developmental contexts and are unlikely to be representative of the experiences of young people (e.g. Byrne et al., 2007; Byrne & Mazanov, 2002; Compas, 1987b). It is therefore considered inappropriate to utilise inventories of adult stressors in adolescent populations (Byrne et al., 2007; Byrne & Mazanov, 2002). Table 2 (continued on pp 19 -21) presents examples of stimulus-oriented measures appropriate for use in populations of young people, separated into simple checklists and life change inventories. In addition to utilising such established measures, researchers often assemble idiosyncratic stressor checklists specific to their study (e.g. Akgunduz, Dalgic, & Kale, 2016; Almeida & Kessler, 1998; Carter et al., 2015; Kiang & Buchanan, 2014; Larson & Moses, 2014; Newland et al., 2014); these scales often lack a strong evidence base.

Table 2

*Examples of Stimulus-Oriented Stress Measures Appropriate for Use in Populations of Young People*

Measure	Description	Population	Evidence-Base
<b><u>Simple Stressor Checklists</u></b>			
<u>Multicultural Events Scale for Adolescents</u> (Gonzales, Gunnoe, Jackson, & Samaniego, 1996, as cited in Gonzales, Tein, Sandler, & Friedman, 2001)	70 item checklist consisting of stressors specific to adolescents living in multi-ethnic, urban environments.	Adolescents	Initial validation of factor structure (Gonzales et al., 2001).
<u>Student Rating of Environmental Stressors Scale</u> (Suldo, Dedrick, Shaunessy-Dedrick, Fefer, & Ferron, 2015b)	37 item checklist capturing 6 domains of environmental stressors relevant for high school students (academic requirements, parent-child conflict, academic and social struggles, financial problems, cultural issues, major life events).	Adolescent students	Initial evidence for validity in the development study (Suldo et al., 2015b).
<u>Life Events Checklist</u> (Johnson & McCutcheon, 1980, as cited in Suldo et al., 2015b)	Simple checklist, wherein respondents indicate whether or not they have experienced each stressor within the past year.	Older children/adolescents	Shares meaningful relationships with youth psychological functioning (Suldo et al., 2015b). Adequate test-retest reliability (Chappel, Suldo, & Ogg, 2014).

(Continued on next page)

Table 2 continued.

Measure	Description	Population	Evidence-Base
<u>Life Stressors and Social Resources Inventory – Youth Form</u> (Moos & Moos, 1994)	Checklist of stressors encompassing eight major areas of life experiences: physical health, school, home and money, parents, siblings, extended family, boyfriend/girlfriend, and friends and social activities.	12 to 18 year olds	Adequate to very-good reliability in development study (Moos & Moos, 1994).  Meaningful relationships with relevant psychological variables in small-scale cross-sectional research (Ash & Huebner, 2001; Moos & Moos, 1994) .  Normative data available based on a sample of 400 youths (Moos & Moos, 1994).
<u>High School Stressors Scale</u> (Burnett & Fanshawe, 1997)	68 item checklists consisting of stressors relevant for high school students.	Adolescents	Initial evidence for validity and reliability in the development study (Burnett & Fanshawe, 1997).
<b><u>Life Change Inventories</u></b>			
<u>Life Events and Coping Inventory</u> (Dise-Lewis, 1988)	This measure consists of two subscales: 1) The Life Events subscale, which captures both significant life events and daily hassles, and assigns weighted scores based on the ‘stressfulness’ of each event, and 2) the Coping subscale, which captures how young people cope with these events.	12-14 year old children	Shares meaningful empirical relationships with psychological and behavioural variables (Dise-Lewis, 1988).  Demonstrated good reliability in small-scale studies of ethnically diverse urban youths (Coyle & Vera, 2013; Vera et al., 2012).

(Continued on next page)

Table 2 continued.

Measure	Description	Population	Evidence-Base
<u>Life Events Scales</u> (e.g. Coddington, 1999)	<p>Assess the prevalence, frequency, and timing of developmentally specific life events, with life change units assigned on the basis of the effect on personal growth and adjustment.</p> <p>This scale is based on Holmes and Rahe's (1967) Social Readjustment Rating Scale, arguably the most researched life change inventory of adult stressors.</p>	<p>3 versions:</p> <p>Preschool: &lt;5 years</p> <p>Child: 6-12 year olds</p> <p>Adolescent: 13-19 year olds</p>	<p>The scale manual (Coddington, 1999) and subsequent empirical research (e.g. Michell, 1997; S. G. Williams et al., 2017) has provided extensive evidence of the reliability and validity of each of the three Life Events Scale versions.</p> <p>These scales, or measures based on Coddington's approach (e.g. Garnezy, Masten, &amp; Tellegen, 1984; Yeaworth, York, Hussey, Ingle, &amp; Goodwin, 1980; Ystgaard, 1997), were the most widely-used youth-specific stressor measures in the literature reviewed.</p>

The measures reviewed in Table 2 implicitly assume that all demanding stressors are associated with life change and are therefore equally 'stressful'. However, considering all stressors as the same in this way is argued to disregard the potential for positive outcomes from exposure to environmental demands (Cavanaugh et al., 2000; B. D. Edwards, Franco-Watkins, Cullen, Howell, & Acuff, 2014; F. Jones & Kinman, 2001; Mullis et al., 1993). Further, it is suggested that the perceived desirability of events is an important predictor of mental health criteria (e.g. Swearingen & Cohen, 1985b). In response to this, various stimulus-oriented measures have been proposed which differentiate between positive and negative environmental demands; see Table 3 (continued pp. 23 - 24). While these measures allow for stressors to be separated according to their positive or negative valence, it is argued that imposing an *a priori* classification fails to recognise the importance individual differences in stress appraisal (B. D. Edwards et al., 2014; González-Morales & Neves, 2015).



Table 3

*Stimulus-Oriented Stress Measures that Differentiate between Positive and Negative Valanced Stressors*

Measure	Description	Population	Evidence-Base
<u>The Hassles and Uplifts Scale</u> (Kanner, Coyne, Schaefer, & Lazarus, 1981)	Scale consisting of 117 hassles (irritating, frustrating, distressing demands) and 135 uplifts (positive experiences).	Adults	Significant cross-sectional relationships with relevant external criteria (Kanner et al., 1981; Lazarus, 1990).  Adapted for cross-cultural research (e.g. Kaniel & Siman-Tov, 2011).
<u>Challenge- and Hindrance-Related Stress Measure</u> (Cavanaugh et al., 2000)	11-item checklist, which differentiates work-related demands into either negative hindrances (organisational politics, formality and red tape, role ambiguity, job insecurity) or positive challenges (time pressure, work scope, high workload/duties).	Adults working in an organisation	The initial development paper evidenced promising psychometric properties (Cavanaugh et al., 2000).  Substantial subsequent research has supported the reliability and validity of the scale in large scale studies of organisational staff (e.g. Boswell, Olson-Buchanan, & LePine, 2004; Chou, Chu, Yeh, & Chen, 2014; Geng, Liu, Liu, & Feng, 2014; Hon et al., 2013; M. Ozer, Chang, & Schaubroeck, 2014; Yuan, Li, & Lin, 2014).

(Continued on next page)

Table 3 continued.

Measure	Description	Population	Evidence-Base
<u>Academic Challenge-Hindrances Measure</u> (LePine, LePine, & Jackson, 2004)	Checklist of academic experiences, categorised as either negative hindrances or positive challenges.	Older adolescent students	Adequate reliability in large samples of university students (LePine et al., 2004; Zhu, He, & Wang, 2017).  Confirmatory factor analysis in sample of Chinese adolescents supports 2 factor structure (Zhu et al., 2017).
<u>Stressful Life Events Checklist</u> (Booker, Gallaher, Unger, Ritt-Olson, & Johnson, 2004)	Checklist of life events relevant to multiethnic youth and placed into categories based on their domain (school, family, peer, or personal relationships) and valence (positive or negative).	Children and adolescents	Good reliability in large multiethnic sample of young people aged 10-15 (Booker et al., 2004).
<u>Diary Checklist of Interpersonal Events</u> (Flook, 2011)	Checklist of 2 positive and 3 negative interpersonal events completed daily in a diary format.	Adolescents	Limited empirical evidence base.

In addition to checklists and inventories, life stressors may also be measured using semi-structured interviews (Monteiro & Marques-Pinto, 2017; Rudolph & Hammen, 1999). Interviews are proposed by some researchers to be advantageous over traditional inventories as they elicit more experiential and contextual detail regarding relevant stressors (Byrne et al., 2007; Rudolph & Hammen, 1999; Rudolph et al., 2000). However, there is currently little empirical research comparing the efficacy of interviews to

checklist measures and the former is currently substantially less common due the increased participant and researcher burden (Byrne et al., 2007; Grant et al., 2004).

Proponents of the stimulus approach suggest the measurement procedure is simple and easily accessible to a broad range of respondent populations (S. Cohen et al., 1983; Grant et al., 2004). Further, it is argued that stimulus-oriented scales are relatively objective, with little influence of subjective, individual response biases on measurement (S. Cohen et al., 1983; Lazarus, 1990; Rudolph & Hammen, 1999). The primary limitation of the stimulus approach however is that the measures are limited in scope and fail to account for the complexities of the stress process. Equating the number of demanding life events to 'stress' is argued to be overly simplistic and to disregard any individual variation in response (F. Jones & Kinman, 2001; Lazarus, 1990). For example, getting married may represent a demanding stressor for some people and not for others, dependent on their perception of this event. In particular, scales which assign invariable 'life change' ratings overlook individual differences and personal context with regard to the impact of specific stressors (F. Jones & Kinman, 2001; Rudolph & Hammen, 1999). For example, one may assume that the retirement of a busy employee used to working 70 hours per week would cause more readjustment and change than that of a casual employee who had previously worked one day a week. The stimulus approach is further limited by the implication that stressors are, in and of themselves, the cause relevant outcomes. This is contrary to current psychological theory, which asserts that an individual's response to demands is determined by their perception and appraisal of the stressor and that the 'cause' of outcomes is therefore better understood as the appraisal-mediated response to the stressor, not the stressor itself (S. Cohen et al.,

1983). Empirically, research utilising the stimulus approach has produced inconclusive, modest results with regard to relevant psychosocial outcomes (F. Jones & Kinman, 2001; Lazarus, 1990). These limitations and the “assumed centrality of the cognitive appraisal process” (S. Cohen et al., 1983, p. 386) suggests that the response or interactional approaches described below are preferable over stimulus measures.

### ***1.3.1.2 Response approach to stress measurement***

In the response approach, ‘stress’ is defined as an individual’s response to demanding stressors. An individual’s stress level is therefore considered to be dependent on their appraisal of environmental demands and the subsequent response (Mullis et al., 1993; Murdock, Gorman, & Robbins, 2015). This approach aligns with contemporary theory which asserts that stress is a predominantly subjective phenomenon, mediated by an individual’s perception and appraisal of demanding stressors (e.g. S. Cohen et al., 1983; Lazarus, 1990; Rudolph & Hammen, 1999).

By emphasising individual appraisal and focussing on the stress response, this approach allows for the differentiation between distress and eustress. However, reviewing the literature, only two scales were identified that captured both the positive and negative aspects of the stress response. The Self-Report Stress Response Questionnaire (SRSRQ; Hargrove, Casper, & Quick, 2014)<sup>4</sup> is a 10-item scale capturing organisational stress and comprising of two subscales: 1) the negative stress response subscale, capturing the “destructive and disadvantageous cognitive response to stressors” (Hargrove et al., 2014, p. 4); and, 2) the positive stress response subscale,

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<sup>4</sup> This scale was originally developed in Hargroves’s (2012) dissertation and later refined and presented at the Annual Conference of the Society of Industrial and Organizational Psychologists (Hargrove et al., 2014).

capturing the “constructive and advantageous cognitive response to stressors” (Hargrove et al., 2014, p. 4). In the initial development studies, the scale had excellent reliability and demonstrated meaningful relationships with existing stress scales and theoretically relevant variables (Hargrove, 2012; Hargrove et al., 2014). Despite these promising results, the evidence base for the SRSRQ is small and no subsequent empirical studies could be located that utilised the scale. The Stress Professionnel Positif et Négatif [*Positive and Negative Professional Stress*] Scale (SPPNS; De Keyser & Hansez, 1996) likewise measures stress in the organisational context and is comprised of two dimensions: 1) stress associated with negative psychological responses, capturing distress, and including items such as ‘I find my work mentally exhausting’; and, 2) stress associated with positive psychological responses, capturing eustress, and including items such as ‘my work allows for self-fulfilment’. There is limited empirical evidence supporting the reliability and validity of the SPPNS; in the one study located in the literature utilising the scale, it demonstrated only minimally-respectable internal reliability (Verhaeghe, Vlerick, Gemmel, Maele, & Backer, 2006). Further limiting the use of the SPPNS, the original scale is in French and no studies could be located examining the validity of the translated English version.

Considering these two measures, both focus exclusively on the adult organisational context and are therefore largely inappropriate for use in adolescent populations. Further, there are limited empirical results supporting the psychometric properties of either scale. As such, no measure was found to appropriately capture both distress and eustress in an adolescent context. However, several measures were located that individually capture each aspect of the stress response, reviewed below.

#### 1.3.1.2.1 *Existing measures of the negative stress response*

While response-oriented measures *can* account for eustress, the overwhelming majority of scales are exclusively negatively focussed and capture what this thesis defines as distress. By far the most commonly utilised stress measure in the reviewed literature was the Perceived Stress Scale (PSS; S. Cohen et al., 1983), which frames 'stress' as a negative, pathological phenomenon and measures the extent to which one finds their life to be unpredictable, uncontrollable, and overloading. The measure was initially developed as a 14-item scale, however, subsequent research has produced 10- and 6-item versions, with all forms demonstrating high-quality and robust properties in numerous empirical studies (e.g. Bluth & Blanton, 2015; S. Cohen et al., 1983; Suldo et al., 2015b). The 10-item version is the most prevalent in the adolescent literature and has demonstrated consistently good reliability and strong evidence of validity in samples ranging from 11 to 79 years old (e.g. Aschbacher et al., 2013; Austin et al., 2009; Brand et al., 2014; Chung & Cheung, 2008; Crum et al., 2013; O'Sullivan, 2011; Ramesh Bhat et al., 2012; Vacek et al., 2010; Vera et al., 2012; S. G. Williams et al., 2017). The other prominent scale in the reviewed literature was the Depression Anxiety Stress Scale (DASS; Lovibond & Lovibond, 1995), which, as the name suggests, captures the emotional states of depression, anxiety, and stress. As with the PSS, the DASS frames stress in an exclusively negative context, defining it as an inherently negative emotional state. Two versions of the DASS exist, the original 42-item scale and a shortened 21-item version, both of which have demonstrated excellent validity and reliability in adult samples (e.g. Lovibond & Lovibond, 1995; Psychology Foundation of Australia, 2018). However, longitudinal research suggests the DASS has a unidimensional structure in samples of

children and adolescents and fails to appropriately differentiate between depression, anxiety, and stress (Patrick, Dyck, & Bramston, 2010). This indicates that it may not be a valid measure of stress in youths. Despite the uneven evidence for the scale's use in adolescent populations, the DASS is widely used in clinical settings by multidisciplinary psychological and medical professionals with children as young as seven years old (Patrick et al., 2010; Psychology Foundation of Australia, 2018). In the South Australian context<sup>5</sup>, the DASS is also commonly used as a key performance indicator for clinical psychologists.

Other, less frequently used, youth-focussed measures of the negative stress response are summarised in Table 4 (continued pp. 30 -31). In addition to these established measures, some studies captured stress using a single item, asking simply 'how stressed' respondents feel (e.g. B. D. Edwards et al., 2014; Van Laethem et al., 2016; Zniva, Pauli, & Schulz, 2017). Broadly these one-item measures lack an empirical evidence-base.

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<sup>5</sup> i.e. the setting of this thesis

Table 4

*Response-Oriented Measures of the Negative Stress Response Appropriate for Use in Populations of Young People*

Measure	Description	Population	Evidence-Base
<u>The Adolescent Stressor, and Coping Measure</u> (de Anda et al., 2000)	143 closed-ended questions which examine a) the degree of stress experienced, b) the frequency with which specific coping strategies are employed and their perceived effectiveness, and c) the frequency with which specific stressors are experienced.	Adolescents	Good reliability in small samples of high school students (de Anda et al., 2000).
<u>Stress Response Scale for Adolescents</u> (Curtis & Adams, 1991)	Measure of self-perceived stress responses of adolescents. Literature review used to identify adjectives used to describe physiological, behavioural, and cognitive/emotional components of stress and developed into 34 items.	14 - 21 year olds	Initial studies show good reliability and evidence of validity (Curtis & Adams, 1991).
<u>Perceived Stress Scale for Children</u> (White, 2014)	Screening tool to identify children at risk of chronic stress, resulting in poor overall health.	5 - 18 year olds	Discriminates between children with known stress-related and anxiety disorders and typically developing children (White, 2014).

(Continued on next page)



Table 4 continued.

Measure	Description	Population	Evidence-Base
<u>Academic stress questionnaire</u> (Lakaev, 2009)	Measure of cognitive academic distress and psychosomatic distress specifically in University students.	University Students	Sound psychometric properties in initial, cross-cultural development study (Lakaev, 2009).  Good reliability in small scale study of adolescent university students (González-Morales & Neves, 2015).

#### 1.3.1.2.2 Existing measures of the positive stress response

The most commonly cited measure of eustress in the reviewed literature was the Academic Eustress Scale (AES; O'Sullivan, 2011). This scale specifically focusses on academic stress in adolescent and young adult populations and defines eustress as both the process of responding positively to stressors and the positive outcomes of this process. The AES has demonstrated some evidence of reliability in small samples of undergraduate University students from America (O'Sullivan, 2011), Malaysia (Chua, Ng, & Park, 2018), the Philippines, and Argentina (Mesurado et al., 2015). However, the scale has several notable shortcomings, principally that no evaluation study is available and the original paper (O'Sullivan, 2011) provides no theoretical justification for the choice of items nor any evidence for the validity of the scale. This is not to say that the AES was developed without reference to theory and validity, just that this evidence is not readily available in the published literature for critical examination.

The vast majority of other scales measuring eustress came from the field of sport and exercise psychology. Within this context, eustress is defined as the positive sense of excitement and adrenaline experienced by individuals when playing or watching a closely contested sports match and is considered to be significant motivator for engagement with sport (A. Cohen, 2017; A. Cohen & Avrahami, 2005; Wann, 1995). The most commonly utilised measure in this field was the Sports Fan Motivation Scale (SFMS; Wann, 1995), which captures eustress along with seven other factors believed to be motivators for sports fandom (self-esteem, escape, entertainment, economic, aesthetic, group affiliation, and family needs). The SFMS has generated a large body of research and has demonstrated reliability and validity in samples as young as 17 years (A. Cohen, 2017; A. Cohen & Avrahami, 2005; Wann, 1995; Wann, Royalty, & Rochelle, 2002; Wann, Schrader, & Wilson, 1999; Yousaf, Bashir, & Amin, 2015). Other measures incorporating eustress as a motivator for engagement with sports include the Sports Need for Achievement and Power Scale (Sloan, Bates, Davis, & Schweiger, 1987, as cited in Yousaf et al., 2015), Gratification-Obtained Questionnaire (K. Kim, Cheong, & Kim, 2016), and the Adapted Fantasy Sports Motives Scale (Dhurup & Dlodlo, 2013). These scales are less commonly utilised than the SFMS and have limited empirical evidence bases.

Two final response-oriented scales purporting to measure positively defined stress were identified in the literature. The Psychological Adaptation Scale (Biesecker et al., 2013) assesses four components of adaptation to a chronic health condition: self-esteem, positive stress, social integration, and spiritual/existential meaning and has shown some evidence of reliability and validity for adults with a diagnosed chronic health condition (Biesecker et al., 2013; Yanes, Humphreys, McInerney-Leo, & Biesecker, 2016).

However, this scale defines ‘positive stress’ as ‘effective coping with stressful demands’, and therefore does not align with the current thesis’ conceptualisation of eustress (briefly outlined in Section 1.1, p. 1, and justified in Chapter 3). The Maugeri Stress Index (Massidda et al., 2017) assesses an individual’s resources for coping with stressful situations in the workplace, with high scores purported to indicate high perceived job eustress. This scale is contextualised within organisational psychology and has been used predominantly in samples of adult health care professionals, where it has shown initial evidence for reliability and validity (Massidda et al., 2017).

#### *1.3.1.2.3 Proxy measures of the stress response*

The review of existing measures above shows that no existing measure aligns with holistic theoretical understandings of stress and while there are several psychometrically-sound measures of the negative stress response, no good quality measure of general eustress as it is defined in the current thesis was available in the literature. In response to this dearth of validated, reliable measures, various authors have used positive and negative emotional states as proxy measures of distress and eustress (e.g. J. R. Edwards & Cooper, 1988; Little et al., 2007; Merino, Privado, & Arnaiz, 2018; Nelson & Simmons, 2003; Parker & Ragsdale, 2015; Simmons & Nelson, 2001; Simmons et al., 2001). Based on a review of the theoretical and empirical literature, J. R. Edwards and Cooper (1988) suggested that eustress may be indicated by positive emotional states, specifically hope, positive affect, and meaningfulness, and distress by negative emotional states, specifically negative affect. This approach to measurement has been utilised by influential researchers Nelson and Simmons in investigating their Holistic Stress Model (see for further Chapter 3; Little et al., 2007; Nelson & Simmons,

2003; Simmons & Nelson, 2001; Simmons et al., 2001). Other common indicators include using pain, burnout, and strain as proxies for distress and vigour as a proxy for eustress (e.g. Kung & Chan, 2014; Parker & Ragsdale, 2015).

#### *1.3.1.2.4 Limitations of the response-approach to stress measurement*

Response-oriented stress measures are commonly criticised for sharing significant conceptual overlap with relevant outcome variables, potentially contributing to spurious research findings (Byrne et al., 2007; Byrne & Mazanov, 2002; Carter et al., 2015; Lazarus, 1990; Lazarus & Folkman, 1987; Rudolph & Hammen, 1999). It is argued that some level of confounding is inevitable when using response-based measures as appraisal “is bound to contain a subjective sense of harm, threat, or challenge, which in turn, overlaps with the dependent variable” (Lazarus, 1990, p. 9). This is compounded when using proxy measures of the stress response, such as those described above. It is further suggested that self-report response measures have historically been based in conceptualisations of psychopathology rather than being truly driven by stress theory (Curtis & Adams, 1991; Lazarus, 1990). Finally, it is argued that response-oriented measures disregard the importance of the source of stress and any mediating processes this may have on the response (Lazarus, 1990).

#### *1.3.1.3 Stimulus-response approach to stress measurement*

In the stimulus-response approach, ‘stress’ is defined as the interaction between exposure to demanding stressors and the resultant response. Measurement combines the stimulus- and response- approaches described above, asking participants to first indicate whether they have been exposed to certain stressors and then asking them to rate their subjective response to this demand (S. Cohen et al., 1983). Existing stimulus-

response interactional measures in the literature have largely centred on the adult organisational context (e.g. Questionnaire of Sources and Stress (Friedrich, Greenberg, & Crnic, 1983), Pressure Management Indicator (S. Williams & Cooper, 1998), Job Stress Scale (Cooper, 1981, as cited in Saksvik & Hetland, 2011), Job Stress Survey (Spielberger & Vagg, 1999)) or focussed on highly-specific populations (e.g. Dealing with Illness Scale (McCain & Cella, 1995), Index of Sources of Stress in Nursing Students (Gibbons, Dempster, & Moutray, 2009b); Beck and Srivastava (1991) Stress Inventory, Perceived Stress Scale (Sheu et al., 2002)). For adolescent stress, the most commonly utilised stimulus-response measure in the reviewed literature was the Adolescent Stress Questionnaire (ASQ; Byrne & Mazanov, 2002). This scale was developed to address life events specific to adolescents, with respondents indicating whether they have been exposed to each event and rating the impact of these potential stressors on a scale ranging from 'Not at all stressful (or is irrelevant to me)' to 'Very stressful'. The ASQ has evidenced sound reliability and validity in both small and large samples of adolescents from a variety of countries (Byrne et al., 2007; Byrne & Mazanov, 2002; De Vriendt et al., 2011; Glozah & Pevalin, 2014; Moksnes, Espnes, & Haugan, 2014; Moksnes, Løhre, et al., 2014). However, the measure is limited by the negative framing of life events. By conforming to lay meaning of 'stressfulness', the ASQ implicitly assumes stressors are invariably negative and lead to distress, thereby discounting the possibility of eustress.

Overcoming this limitation, some interactional measures ask respondents to rate events in terms of their perceived desirability and/or allow for the differentiation between positively and negatively valenced stressors. Most relevant for differentiating the two stress responses is the Valencia Distress-Eustress Appraisal Scale (VEDAS;

Rodríguez, Kozusznik, & Peiró, 2013). This scale focusses on the organisational context and asks respondents to rate each of the 20 included occupational stressors in terms of the amount of perceived pressure/threat (capturing distress) and opportunity/challenge (capturing eustress). Empirically, the VEDAS has mainly been used by its' authors, with the scale demonstrating consistently sound reliability and meaningful relationships with associated variables in samples of Spanish professionals (Kozusznik, Rodríguez, & Peiró, 2012; Kozusznik et al., 2015; Rodríguez et al., 2013). However, given the organisational focus, the VEDAS is largely inappropriate for use in general adolescent samples.

Table 5 (continued pp. 37 - 39) outlines additional adolescent-appropriate stimulus-response interaction-oriented stress measures, separated into those that are exclusively negatively framed and those that consider the positive or negative valence and impact of a stressor.

Table 5

*Stimulus-Response Interaction-Oriented Stress Measures Appropriate for Use in Populations of Young People*

Measure	Description	Population	Evidence-Base
<b><u>Negatively Framed</u></b>			
<u>Stress perceived scale</u> (H.-F. Wang & Yeh, 2005)	Contains 29 stressors related to school exams, with subjects rating how 'stressed' they feel about each.	Older adolescents	Limited empirical evidence base. Initial reliability and validity estimates reported in development study (H.-F. Wang & Yeh, 2005).
<u>The Problem Questionnaire</u> (Seiffge-Krenke, 1995, as cited in Noor & Alwi, 2013)	Assesses the 'stressfulness' of 64 events identified as salient, everyday stressors in adolescence.	Adolescents	Limited empirical evidence base; some evidence of good reliability (Noor & Alwi, 2013).
<u>Childhood Traumatic Event Scale</u> (Pennebaker & Susman, 1988)	Respondents indicate if each of the 6 traumatic events occurred before the age of 17, and rate how traumatic is was on a 7-point scale ('not at all' to 'extremely').	Adult and older adolescents	Some evidence supporting reliability and validity (Noyes et al., 2002; P. G. Williams, Rau, Cribbet, & Gunn, 2009).

(Continued on next page)

Table 5 continued.

Measure	Description	Population	Evidence-Base
<u>Social Stress Questionnaire</u> (Connor-Smith & Compas, 2002)	Measures interpersonal stressors, with respondents asked to rate their level of perceived stress on a 4-point scale.	Older adolescents	Utilised in undergraduate university students (Connor-Smith & Compas, 2002; Murdock et al., 2015).  Limited empirical evidence base.
<u>Daily Hassles Questionnaire</u> (Rowlison & Felner, 1988)	Inventory of day-to-day concerns of children and adolescents, with respondents rating each item on a 4-point scale from 'not at all a hassle' to 'a very big hassle'.	Children and adolescents	Excellent reliability in large samples of young people (S. M. Cooper, Guthrie, Brown, & Metzger, 2011; Rowlison & Felner, 1988).  Evidence of validity in samples of urban youth (S. M. Cooper et al., 2011).
<u>Sources of Stress Inventory</u> (Suldo, Shaunessy, Thalji, Michalowski, & Shaffer, 2009)	48 items within seven factors that capture problems relevant to International Baccalaureate students related to school, families, friends, sports, and new transitions such as employment and college. Subjects rate stressfulness on 5-point scale from 'not at all stressful or has not occurred' to 'very stressful'.	Adolescent students	Sound psychometric properties in samples of International Baccalaureate students (e.g. Suldo et al., 2009).

(Continued on next page)



Table 5 continued.

Measure	Description	Population	Evidence-Base
<b><u>Differentiate Positive from Negative Valence</u></b>			
<u>Adolescent Perceived Events Scale</u> (Compas, Davis, Forsythe, & Wagner, 1987)	Measure contains list of major life events and daily events relevant for adolescents. For each item, the respondent rates the frequency of occurrence, desirability (from 'extremely bad' to 'extremely good') and the impact of the event.	3 versions for Young, Middle, and Older Adolescents	Development study showed good test-retest reliability and initial validity of the scale (Compas et al., 1987).
<u>Junior High Life Experiences Survey</u> (Swearingen & Cohen, 1985b)	Subjects are asked to report life events experienced in the past 6 months, categories them as negative, positive, or neutral, and rate their impact on a 7-point scale from 'very bad change', to 'very good change'.	Older children and young adolescents	Development studies support the validity of the scale (Swearingen & Cohen, 1985a, 1985b).
<u>Life Experiences Survey</u> (Sarason et al., 1978)	Subjects asked to rate list of life events according to desirability (positive/negative) and impact (7-point scale from extremely negative to extremely positive).	Adult and adolescents	Sound reliability and validity in samples of undergraduate students (Anderson & Arnoult, 1989; Sarason et al., 1978).  Utilised in samples of high school students (Mullis et al., 1993).

Interaction-oriented measures are proposed to overcome the limitations of both the stimulus and the response approaches by considering both the centrality of cognitive appraisal and the source of the stress reaction. However, empirical evidence suggests that individuals often misattribute their stress response to a particular stressor, when it may be due to another source or a combination of stressors (S. Cohen et al., 1983). Further, while the interaction approach allows for the measurement of both positive and negative stress responses, the majority of measures are negatively-framed and incompatible with an understanding of eustress (e.g. Gibbons, 2010; Gibbons, Dempster, & Moutray, 2008). Even in those youth-focussed scales that do allow for both positive and negative responses to stress, the two are presented as opposite ends of continuum, rather than as distinct, but related, constructs. This assumption does not align with the definitions of stress outlined in Section 1.1 (p. 1) and is counter to current psychological theory (discussed in Chapter 3). As such, no existing youth-focussed stimulus-response measure captures distress and eustress as defined by the current thesis.

#### **1.4 Rationale and Overarching Aim for the Current Research**

Adolescence is characterised by an acceleration of demanding physical, psychological, and environmental changes, leading it to be a crucially stressful period of the lifespan. In addition to increases in demanding stressors, adolescent brains are more physiologically responsive and vulnerable to the impact of this stress (Lupien et al., 2009). Clinically, stress strongly impacts on adolescents' physical and psychological health and these early experiences form the foundation of adult functioning. Adolescence is therefore a developmental period associated with both elevated stress and greater vulnerability to this, with long term impacts. In this context, adolescence represents a critical period of both risk and opportunity for clinical psychological

intervention, with successful navigation of this developmental period requiring the acquisition of relevant stress management skills.

While the underlying assumption of lay people and much existing research is that stress is inherently dysfunctional, current psychological theory describes the stress response as an unavoidable occurrence that can be delineated into both negative ‘distress’ and positive ‘eustress’. Despite prominent theoretical conceptualisations accepting eustress, this concept has received markedly less research interest (e.g. Le Fevre, Kolt, & Matheny, 2006; Le Fevre et al., 2003). This can be at least partially attributed to the lack of good quality measures of the construct (e.g. Heikkilä & Mattila, 2018; O'Sullivan, 2011), with the lack of research on eustress perpetuated by the near-exclusive use of negatively-biased measures that discount the possible positive impacts of stress. Epistemologically, there is a divide in the psychological literature as to whether stress should be measured at the level of the stressor, the stress response, or as an interaction between the two. Each approach has utility in different situations, yet on balance the response-approach demonstrates the strongest theoretical and empirical basis for use in clinical psychological practice and is best aligned with the definition of stress utilised in the current thesis.

Although there is arguably an over-abundance of stress measures in the literature, these scales are open to methodological and conceptual criticism (Byrne et al., 2007). Crucially, upon reviewing the literature there were only three measures that capture both the positive and negative stress response (i.e. the SRSRQ (Hargrove et al., 2014), the SPPNS (De Keyser & Hansez, 1996), and the VEDAS (Rodríguez et al., 2013)) and all focus on the adult work context. Further, while numerous measures of the negative adolescent stress response are available, there is no good-quality measure of eustress. There is thus no measure of the adolescent stress response available in the

literature that adequately aligned with current theoretical understandings of the construct.

Good quality measurement of mental health constructs is crucial for the field of clinical psychology. The use of measures which lack a strong theoretical basis and sound psychometric properties contributes to erroneous conclusions and impedes both clinical research and practice. It is unsurprising that when the majority of measures are predicated on the assumption that stress is deleterious, the extant empirical literature is biased towards researching the negative effects of stress. A balanced investigation of the clinical effects of stress on mental health requires a similarly balanced measure. In this context, a measure of the adolescent stress response, which incorporates both distress and eustress is critical for sound research and clinical practice. As Byrne et al. (2007) summarises:

There can be no doubt therefore that the experience of adolescent stress constitutes an issue of central importance to the broader understanding of adolescent health. In this context the availability of a valid and reliable instrument with which to measure adolescent stress is essential (p. 394)

#### **1.4.1 Thesis Aim**

The overarching aim of the current project was to address this gap in the literature by developing a holistic self-report measure of the adolescent stress response, which encompasses both the positive and negative aspects of the construct. This central goal is addressed in a series of sequential analytic investigations, with specific aims laid out in the following theory and methodology chapter. Overall, the research aims to bridge the disjunct between theory and measurement, leading to gains in knowledge, insight, and understandings, and providing a good quality measure with which to advance clinical research on adolescent stress.

## **CHAPTER 2. THEORETICAL PARADIGM AND METHODOLOGICAL FRAMEWORK**

As identified in the introductory chapter, the overall aim for the current thesis was to develop a holistic self-report measure of the adolescent stress response. Working toward this goal, a series of investigations were undertaken to develop the Adolescent Distress-Eustress Scale (ADES). Chapter 2 presents an overview of the theories and methods used in this research. It begins by discussing Positive Psychology, which serves as the theoretical macro lens through which the thesis as a whole may be viewed; research methods, results, and interpretation were contextualised within this paradigm. Next, relevant psychometric scale development theory is reviewed and a rationale given for the use of Classical Test Theory in the developing the ADES. Finally, the overall research methods of the thesis are outlined, with a description of the methodological scale development framework used to structure the thesis, the collaborative, inclusive methodological approach, and the recruitment sites and general ethical considerations for data collection. All included research was conducted in Adelaide, South Australia, with primary data collection between 2016 and 2018.

### **2.1 Theoretical Paradigm: Positive Psychology**

Growing interest in the positive aspect of stress in the past two decades has coincided with the advent of Positive Psychology, defined as “the scientific study of positive experiences and positive individual traits, and the institutions that facilitate their development” (Duckworth, Steen, & Seligman, 2005, p. 629). As a paradigm, Positive Psychology highlights positive human assets and focusses on the factors and conditions associated with optimal mental health and functioning within both the individual and society at large (e.g. Seligman & Csikszentmihalyi, 2000; Waters, 2011). Positive Psychology was popularised by Professor Martin Seligman in the late 1990s, during his

tenure as the president of the American Psychological Association (e.g. Seligman, 2008; Seligman & Csikszentmihalyi, 2000). Seligman suggested that with regard to mental health, psychology had two overarching goals: 1) curing mental illness, and 2) making lives more productive and fulfilling (Seligman & Csikszentmihalyi, 2000). He argued however that empirical attention and clinical training has traditionally focussed almost exclusively on the first goal. While he accepted this deficit-focussed approach has been successful in advancing the understanding of the aetiology and treatment of mental illness, Seligman concluded that the field has a negative bias and neglects psychological wellbeing (e.g. Duckworth et al., 2005; Seligman, 2008; Seligman & Csikszentmihalyi, 2000). Positive Psychology therefore aims to expand the traditional emphasis of psychology, to focus also on positive human functioning (e.g. Waters, 2011). The holistic conceptualisation of stress utilised in the current project fits well within this perspective, expanding the emphasis of empirical research beyond the traditional negative focus on distress to also positively focus on eustress (Nelson & Simmons, 2003; Rodríguez et al., 2013).

### **2.1.1 Core Theory: The Dual Factor Model of Mental Health**

Traditional models of mental health conceptualised the construct as a single dimension continuum, with wellbeing at the positive extreme and mental illness, or 'illbeing', at the negative extreme (e.g. Antaramian, Huebner, Hills, & Valois, 2010; Greenspoon & Saklofske, 2001; Keyes, 2005). The World Health Organisation however defines health as "a state of complete physical, mental, and social wellbeing *and not merely the absence of disease or infirmity*" (1948, p. 1, emphasis mine). Likewise, Positive Psychology asserts that mental health is more than simply the absence of mental illness.

The Dual Factor Model of mental health posits that wellbeing and illbeing are interrelated, but distinctly separate, constructs (e.g. Greenspoon & Saklofske, 2001). The

absence of illbeing is therefore considered as a necessary, but not sufficient, condition for positive mental health (e.g. Seligman, 2008). This model has been supported empirically in adults (Greenspoon & Saklofske, 2001; Keyes, 2005; Lee & Oguzoglu, 2007) and young people (Antaramian et al., 2010; Suldo & Shaffer, 2008). As such, Positive Psychology posits that a comprehensive understanding of psychological health requires consideration of both illbeing and wellbeing (Keyes, 2005).

Under the Dual Factor Model, individuals can be categorised into four groups based on differing levels of illbeing and wellbeing (Figure 1). 'Flourishing' is considered to be the ideal state of complete mental health wherein individuals experience high wellbeing and low illbeing. 'Floundering' individuals show the opposite pattern, aligning with common understandings of pathological mental illness. However, the added utility of this model is that it identifies individuals who do not display clinical pathology, but who still exhibit suboptimal mental health i.e. the 'struggling' and 'languishing' categories (Antaramian et al., 2010; Greenspoon & Saklofske, 2001; Keyes, 2005; Sin & Lyubomirsky, 2009). These individuals are commonly overlooked in traditional deficit-focussed approaches; however, Positive Psychology argues that these individuals would benefit from intervention to move them towards a flourishing life.

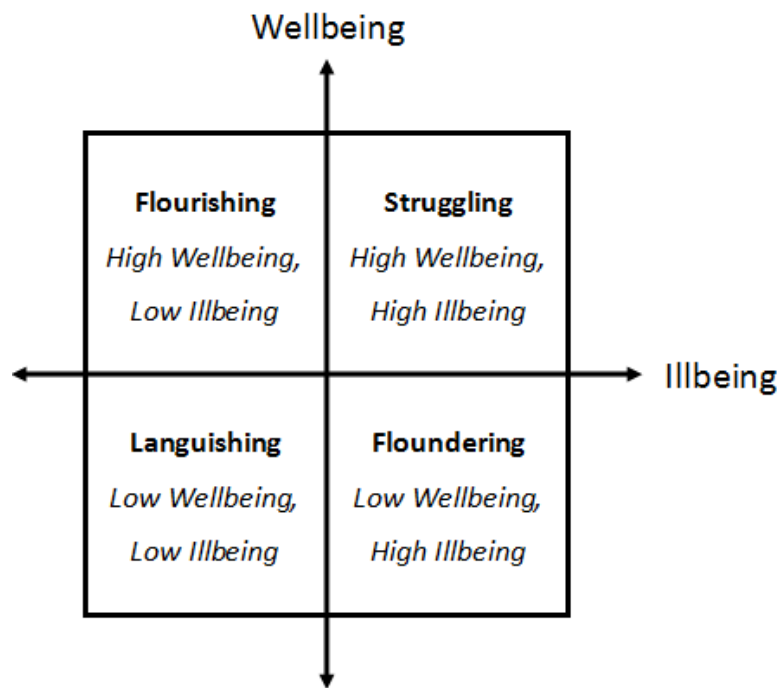


Figure 1. Categories of mental health according to the Dual Factor Model (adapted from Venning et al., 2013).

### 2.1.2 Clinical Applications of Positive Psychology

The logical implication from the Dual Factor Model is that as psychological health is more than the absence of mental illness, therapeutic intervention should aim not just to reduce psychopathology but also to build wellbeing and psychological strengths (e.g. Duckworth et al., 2005; Sin & Lyubomirsky, 2009; Waters, 2011). As outlined by Seligman and Csikszentmihalyi (2000), in Positive Psychology “treatment is not just fixing what is broken; it is nurturing what is best” (p. 7). As such, in addition to being a theoretical research paradigm, Positive Psychology has clear clinical applications.

Positive Psychology Interventions (PPIs) are defined as any “treatment methods or intentional activities that aim to cultivate positive feelings, behaviours, or cognitions” (Sin & Lyubomirsky, 2009, p. 468). Empirically, extant literature substantiates that positive psychological health is amenable to change through intervention, with results from a large-scale meta-analysis demonstrating that PPIs are associated with significantly



enhanced wellbeing in samples of both adults and young people (Sin & Lyubomirsky, 2009). Various evidence-based PPI exercises and activities exist in the literature (for an extensive review the reader is directed to Duckworth et al., 2005), with research suggesting that practicing a range of activities leads to the best therapeutic outcomes (Sin & Lyubomirsky, 2009). Recently, a treatment manual has been published providing a systematic, defined protocol for 'Positive Psychotherapy', which applies PPIs in clinical therapeutic settings (see Rashid & Seligman, 2018).

Critics contend that PPIs shift the focus of clinical psychology away from those most in need: individuals suffering with mental illness (e.g. Held, 2004; Sample, 2003). They argue that Positive Psychology informed intervention minimises the importance of alleviating adverse symptoms and managing negative emotions, which should be considered the most pressing concern of the field. Seligman and colleagues (e.g. Duckworth et al., 2005; Seligman, 2002, 2008; Seligman & Csikszentmihalyi, 2000) counter this criticism in three parts. Firstly, research suggests that promoting wellbeing may actually be one of the better ways of alleviating suffering (e.g. Seligman, 2008). Pertinently, meta-analytic evidence suggests that along with enhancing wellbeing, PPIs are associated with significant decreases in depressive symptoms (Sin & Lyubomirsky, 2009). Incorporating PPIs into individual psychotherapy has also shown promising initial results for a wide range of psychiatric disorders, including borderline personality disorder, schizophrenia, anxiety, PTSD, and psychosis (see Rashid, 2015 for a review). It is additionally argued that building strengths provides a buffer against relapse and/or future occurrence of psychopathology (e.g. Seligman, 2002, 2008; Venning et al., 2013). Secondly, increased positive emotion has been associated with a broad range of highly socially valued outcomes, such as altruism, sociability and prosocial behaviour, and creativity and original thinking (Lyubomirsky, King, & Diener, 2005). There are therefore

clear societal benefits in seeking to increase individuals' psychological wellbeing. Finally, it is argued that people desire wellbeing over and above the alleviation of suffering and it is thus fully justifiable in its own right (Duckworth et al., 2005; Seligman, 2008; Seligman & Csikszentmihalyi, 2000). As Seligman (2002) stated: "Camus wrote that the foremost question of philosophy is why one should not commit suicide. One cannot answer that question just by curing depression; there must be some positive reasons for living as well" (p. 8). However, it is important to note that Positive Psychology does not argue that there should be *no* focus on mental illness and PPIs should be considered complementary to 'psychology-as-usual' (Waters, 2011).

In addition to traditional psychotherapy, PPIs can also be applied across a range of clinical settings. Particularly relevant for adolescents is Positive Education, wherein schools apply Positive Psychology principles to promote both traditional academic skills and the clinical skills of wellbeing, without compromising either (Seligman, Ernst, Gillham, Reivich, & Linkins, 2009; Waters, 2011). As adolescents spend the majority of their day at school, these institutions play a key role in young peoples' development and are argued to be a critical environment for their wellbeing and psychological functioning (e.g. Moksnes, Løhre, et al., 2014; M. A. Zimmerman & Arunkumar, 1994). It is further suggested that given the large amount of time teachers spend with their students, these professionals may be best positioned to recognise and respond to adolescents experiencing poor mental health (Hopkins, 2014). The school context thus provides an opportunity to influence adolescent wellbeing on a wide scale (Chappel et al., 2014; Hopkins, 2014; Seligman et al., 2009). Pertinently for the current thesis, the school environment has been argued to be the most appropriate site for stress-based interventions as adolescents frequently identify the academic experience as the most

‘stressful’ demand in their lives (Ash & Huebner, 2001; de Anda et al., 2000; Moksnes, Løhre, et al., 2014).

Broadly Positive Education involves incorporating psychoeducation and PPIs into school classes, delivered by teachers or school counsellors, with the aim of equipping students with higher-order cognitive, emotional, and social skills to foster positive feelings, behaviours, and/or cognitions (Sin & Lyubomirsky, 2009; Waters, 2011). Positive Education interventions can be targeted or universal and may be preventive or responsive in their provision of support (Hopkins, 2014). In a systematic review incorporating 12 school-based PPI programmes, Positive Education was found to be effective in increasing student wellbeing (Waters, 2011). Research evaluating specific Positive Education programs, suggests these interventions were associated with significant increases in self-efficacy, optimism, and self-esteem, decreased depression and anxiety symptoms, and reduced mental illness and psychopathology in high school students (e.g. Antaramian et al., 2010; Chappel et al., 2014; Lyubomirsky et al., 2005; Shoshani & Steinmetz, 2014). Empirically, the enhancement of wellbeing has also been linked with a broad range of positive outcomes for adolescents including: social success; improved functioning and productivity; enhanced attention; good physical health, longevity, and life expectancy; behavioural engagement with school; increased grit (i.e. perseverance for long term goals); adaptive and positive health behaviours; and less delinquency and aggression (e.g. Chappel et al., 2014; Huppert, 2009; Kern, Benson, Steinberg, & Steinberg, 2016; see Lyubomirsky et al. (2005) for a succinct meta-analytic review). Importantly, adopting a positive focus early in life is argued to “develop a young person’s psychological strengths and lay the foundations of a sustained healthy life in adulthood” (Venning et al., 2013, p. 34) and empirically adolescent wellbeing predicts outcomes such as financial independence, occupational attainment, and work autonomy

in adulthood (Lyubomirsky et al., 2005). Further, while Positive Education considers wellbeing as an equal priority to traditional scholastic learning, there may be potential academic benefits to schools in seeking to enhance student mental health. The Broaden-and-Build Theory posits that experiencing positive emotion generates broad thought-action repertoires that ultimately builds and expands an individual's intellectual, social, and psychological resources and skills (Fredrickson, 2001). Empirically, a meta-analysis examining 213 social and emotional learning interventions delivered to 270,034 students found that participation in positively-oriented, school-based programs was associated with improved academic performance. (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011).

The rising popularity of Positive Education has led to philosophical discussion as to whether it is truly the role of schools and teachers to manage mental health conditions, or if this is outside their scope of responsibility and competency (Hopkins, 2014). Critics also argue that including PPIs in school puts a strain on the already limited budgetary and time constraints (Hopkins, 2014; Seligman et al., 2009). However, Positive Education is well aligned with the 21<sup>st</sup> century aim of schooling to develop the 'whole child' to their fullest potential through social and emotional development as well as intellectual (Organisation for Economic Co-operation and Development, 2018; South Australian Department for Education and Child Development, 2014; United Nations General Assembly, 1989) and as such has become a key government priority in South Australia.

#### ***2.1.2.1 Stress management in Positive Psychology Interventions***

Positive Psychology-informed clinical practice generally conforms to the common assumption that 'stress' is inherently dysfunctional and associated with profoundly negative consequences (F. Jones & Bright, 2001b). As such, there are a number of PPIs

designed to reduce or manage stress as a method of increasing wellbeing (see for example, adolescent-specific programs: Felstead Education, 2019; Mental Health and Wellbeing Education and Training Providers, 2019). However, as with ‘psychology-as-usual’, by adhering to this entirely negatively-focussed understanding of stress, these PPIs overlook any potential for positive outcomes associated with the construct. The results from the current thesis, which differentiate between the positive and negative aspects of stress, therefore have meaningful implications for the implementation of effective PPIs. These are discussed in Chapter 8 and Chapter 9, where a more balanced and holistic approach to stress management is discussed.

## **2.2 Criticism of Positive Psychology**

Positive Psychology and its associated clinical applications have been divisive within the psychology community and society at large, with critics deriding what they see as “New Age mumbo-jumbo” (Sample, 2003; para. 1). As has been discussed above, in the clinical context, it has been suggested that Positive Psychology minimises the key importance of treating and mitigating adverse psychological symptoms. It is also argued that positioning positive emotions as learnable and controllable leads individuals to feel guilty and defective if they are unable to overcome mental illness. Furthermore, critics suggest that by emphasising positive emotions, the potentially adaptive function of negative emotions are overlooked.

Additionally, researchers have also criticised the rigour of the field. Theoretical concerns centre on a failure to account for individual differences and the lack of novelty of the approach (e.g. S. I. Donaldson, Dollwet, & Rao, 2015; Held, 2004; Kristjánsson, 2012). Additionally, it has been argued that Positive Psychology has an individualistic focus, meaning it may not be transferable to collectivist cultures and therefore lacks

universal applicability (e.g. S. I. Donaldson et al., 2015). Finally, from a methodological standpoint, it is argued that there is insufficient good quality research supporting the claims of Positive Psychology and that the field lacks empirical rigour (e.g. S. I. Donaldson et al., 2015; Held, 2004; Kristjánsson, 2012). These criticisms should be carefully considered when working within this paradigm and critical evaluation of the literature is warranted. A recent large scale review of the empirical literature in this area, concluded that while its infancy had led to a limited theoretical and empirical evidence base, Positive Psychology is a growing, valuable field committed to using rigorous methods (S. I. Donaldson et al., 2015). This review concludes with the call for further sound empirical research in the field to “nudge us closer to the original vision of a better scientific understanding of the key factors that enable individuals, communities, organisations, and societies to flourish” (S. I. Donaldson et al., 2015, p. 193). Through methodological rigour and critically reflective application of Positive Psychology principles, the current thesis contributes to this growing literature base of sound research.

## **2.3 Methodological Framework for the Current Research**

### **2.3.1 Psychometric Test Theory**

In its broadest sense, measurement involves “rules for assigning numbers to objects to represent quantities of attributes” (Nunnally, 1967, p. 2). In psychology, these attributes often cannot be directly observed, meaning that measurement scales serve as proxies for the underlying, ‘latent’ constructs. By investigating relationships between measures, researchers indirectly infer the relationships between the latent constructs (DeVellis, 2012). Simplistically, psychometric test theory provides a conceptual framework for understanding the relationship between the observable proxy measures and the latent constructs they are developed to represent (De Champlain, 2010; DeVellis,

2012). Additionally, it provides a structure for the acceptable methodologies and techniques used to develop sound psychological measures (Hambleton & Jones, 1993). There are two main theoretical approaches in psychometrics: Classical Test Theory (CTT), which is the prevailing approach in the literature, and Item Response Theory (IRT), a more contemporary approach that is growing in popularity. In creating the ADES, consideration was given as to the relative merits of these two approaches and in the sections below the theories are briefly summarised and a justification given as to the use of the CTT in the current thesis. For a more comprehensive coverage of psychometric theory, the reader is directed towards key accessible texts by DeVellis (2006, 2012) and Nunnally and Bernstein (1994).

### **2.3.1.1 *Classical Test Theory***

CTT has been the prominent approach to test development in the social and behavioural sciences since the early 20<sup>th</sup> Century (e.g. DeVellis, 2012; Embretson, 1996). Within CTT, an individual's observed score on a measure is assumed to be caused by and therefore accurately reflect the true strength of the underlying latent construct (DeVellis, 2012). However, measurement is considered "an imperfect process and consequently our proxies for unobservable variables are likely to be error-prone to some degree" (DeVellis, 2006, p. 50). For example, in addition to capturing the underlying latent variable, measure scores may also reflect error factors such as: transient personal factors (e.g. fatigue), individual response tendency characteristics (e.g. willingness to express true feelings), or mechanical factors (e.g. response coded incorrectly; Churchill, 1979). As such, the central tenet of CTT is that an individual's observed score on a measure ( $X$ ) is determined by a combination of their true score on the underlying latent variable of interest ( $T$ ) and these sources of error ( $E$ ), as represented by Equation 1 (e.g. Churchill,

1979; DeVellis, 2006, 2012; Hambleton & Jones, 1993; MacKenzie, Podsakoff, & Jarvis, 2005).

$$X = T + E \quad (1)$$

As both T and E are unknown, CTT must make a number of simplifying assumptions to solve Equation 1 (DeVellis, 2006, 2012; Hambleton & Jones, 1993):

1. Individual measure items are comparable indicators of the latent construct.
2. The amount of error associated with each individual measure item is assumed to be random.
3. The error associated with one item is assumed to be uncorrelated with any other item's error.
4. Error is not correlated with the true score of the latent variable.

Additionally, in its strongest form, CTT is based on the 'Strictly Parallel Test Model', which further assumes that:

5. The latent variable affects all scale items equally.
6. The amount of error for each item is equal.

However, it has been argued that these restrictive assumptions are not necessary in order to make useful inferences. As such more liberal models are commonly utilised (e.g. Tau-Equivalent tests), which allow the amount of error variance associated each item to be unequal (i.e. reject Assumption 6; DeVellis, 2012).

While CTT does consider the properties of individual items (e.g. item reliability, discrimination, and difficulty; see De Champlain, 2010; DeVellis, 2006), the primary emphasis of the approach is on groups of items, collectively referred to as 'scales' (DeVellis, 2006). The fundamental objective in CTT is to design a measure that produces scale scores which approximate true latent scores as closely as possible. As the



researcher cannot know the true latent value, observable properties of the scale are used to assess and judge the efficacy of a measure in this regard (Churchill, 1979). Within CTT, the key scale properties considered are reliability and validity.

### **2.3.1.2 Item Response Theory**

IRT is considered as a modern approach to test theory and has grown in prominence in the recent literature (e.g. DeVellis, 2012). Briefly, IRT proposes that each scale item “has its own characteristic sensitivity to the latent variable, represented by an item characteristic curve [ICC] – a plot of the relationship between the value of the latent variable ... and the probability of a certain response to an item” (DeVellis, 2012, p. 29, addition mine). IRT is commonly used in the creation of ability measures (e.g. educational assessment measures), wherein the ICC estimates the probability of an item being answered correctly as a function of the item characteristics and the ability level of the respondent (De Champlain, 2010; DeVellis, 2012). Various non-linear models are used to define the ICC, with the choice of function dependant on the specific research context (De Champlain, 2010). The most commonly utilised model is the three parameter logistic (3PL) model (DeVellis, 2012).

In contrast to CTT which mainly focusses at the scale-score level, IRT specifically concentrates on nature and properties of individual items (Hambleton & Jones, 1993). Relevant item parameters differ according to the ICC model, however, in the context of ability measures, the characteristics calculated in the common 3PL model are 1) item difficulty - the ability an item demands to be answered correctly; 2) item discrimination - the degree to which an item discriminates individuals according to ability; and 3) guessing - the probability low-ability respondents will get the item correct by chance (DeVellis, 2012).

### **2.3.1.3 *Psychometric approach in the current thesis***

Overall, there are justifiable theoretical arguments for and against both CTT and IRT and there is lively ongoing debate in the literature as to the virtues of each approach (see De Champlain, 2010 for an accessible overview). In the psychological literature, CTT remains the prominent approach to scale development due to several key advantages. The main strength of CTT is that it is based on relatively weak assumptions, which are easy to meet with real data in many different testing situations (De Champlain, 2010; Fan, 1998; Hambleton & Jones, 1993). Additionally, from a pragmatic perspective, only moderate sample sizes of approximately 200 to 500 participants are required for analyses (Hambleton & Jones, 1993). Further, the simplicity of the models mean that scale development is computationally accessible (DeVellis, 2006, 2012; Hambleton & Jones, 1993). Contrastingly, IRT's relatively strong assumptions are more difficult to meet with real life measurement data and require large, heterogeneous samples to ensure sound estimates (Hambleton & Jones, 1993). Further, IRT models are conceptually sophisticated when compared to CTT, requiring significantly more statistical and technical ability on the part of the scale developer (Dodeen & Al-Darmaki, 2016; Embretson, 1996). For these reasons CTT is considered to be more tractable for scale developers with a range of statistical ability, leading to its wide-usage and long track record in developing sound psychological measures (DeVellis, 2006, 2012; Hambleton & Jones, 1993). IRT based measures on the other hand are less common in the psychological literature, being used predominantly in the construction of dichotomous response ability tests (i.e. correct vs incorrect; DeVellis, 2012).

Notwithstanding these advantages, the primary limitation of CTT is that within this theory, estimates of scale properties are wholly dependent upon the sample of individuals measured (e.g. DeVellis, 2006; Dodeen & Al-Darmaki, 2016). Generalising

such sample-dependent statistics beyond the setting from which they were generated is therefore open to question (e.g. De Champlain, 2010; DeVellis, 2006). Advantageously for IRT, the complex mathematical techniques used to calculate parameter values result in estimates that are sample-invariant (e.g. De Champlain, 2010; Hambleton & Jones, 1993). This means that IRT-based item parameters are independent of the sample from which they were drawn, thereby addressing the major limitation of CTT-based measures. In addition, by virtue of the item-level focus, IRT-based measures allow for more flexibility of analysis using individual items and can be used to create relatively shorter psychometrically-sound scales when compared to CTT approaches (e.g. DeVellis, 2006; Dodeen & Al-Darmaki, 2016).

Despite the relative merits of each approach, empirical studies comparing CTT and IRT have shown limited differences, with CTT-based measures performing similarly to those based in IRT (e.g. Fan, 1998). Therefore, for the current thesis, the CTT paradigm was adopted in the creation of the ADES, with acknowledgement of the conceptual and pragmatic strengths of the approach, namely its current dominance the psychological literature, evidence of past success, and computational accessibility.

### **2.3.2 Scale Development Framework**

Many methodological frameworks have been proposed for developing self-report measures within the CTT paradigm (e.g. Churchill, 1979; MacKenzie et al., 2005; Rattray & Jones, 2005). These frameworks set out a sequence of procedures and methodologies to be followed when developing a valid and reliable, CTT-consistent scale. In the creation of the ADES, the current thesis utilised DeVellis's (2012) scale development framework as it provides clear, specific, practical, and methodologically-rigorous guidelines and has been successfully used in the development of both adult (Hargrove et al., 2014) and adolescent (Suldo et al., 2015b) measures of stress. DeVellis argues that the successful

completion of this eight-step framework, described below, results in the development of a brief, psychometrically-sound scale appropriate for empirically investigating relationships between constructs and tracking change in an individual or group across time. The wider psychometric literature was also reviewed to identify additional advantageous methods and ensure consensus on the appropriateness of this procedure.

**Step 1: Determine clearly what you want to measure.** The foundation of valid measurement is to ensure that the scale captures the latent construct it intends to measure and does not “inadvertently drift into unintended domains” (DeVellis, 2012, p. 73). Accordingly, determining a clear conceptual definition of the latent construct is the essential first step in the development of a valid scale. Furthermore, as psychological constructs are largely unobservable, intangible phenomena, scales must be constructed from ‘effect indicators’ that serve as observable proxies for the underlying constructs. Therefore, ‘determining clearly what you want to measure’ also requires identifying phenomena that can serve as effective, compelling, and well-founded *observable* indicators of the construct of interest (DeVellis, 2006, 2012).

DeVellis provides no specific methodological procedures for this first step, however, previous psychometric research has largely focussed on conducting reviews of the relevant extant literature and theory (e.g. Churchill, 1979; Hargrove et al., 2014; Suldo, Dedrick, Shaunessy-Dedrick, Fefer, & Ferron, 2015a). In the current thesis, concise definitions of distress and eustress were clearly articulated based on a synthesis of prominent theories of stress in the psychological literature (Chapter 3). To operationalise these definitions, a qualitative approach was used to identify the observable phenomena that adolescents consider as salient indicators of stress (Chapter 4).

**Step 2: Generate an item pool.** After clear conceptual definitions of the constructs of interest are established, the next development step is to generate a large

pool of candidate items for eventual inclusion in the scale. Consistent with CTT, items are generated with reference to the conceptual definition to reflect the underlying latent construct of interest. The primary aim in this step is to generate a set of items that “completely captures the conceptual domain of the construct (i.e., is not deficient) without being contaminated by other related constructs” (MacKenzie et al., 2005, p. 726). Within CTT, each of these items is understood to have been chosen at random from the universe of possible items relating to the latent variables, such that they are assumed to be interchangeable.

The key methodological issues during this stage of scale development are: 1) establishing the conceptual relevance of the items, and 2) ensuring precise, unbiased, and population-appropriate wording of items (Churchill, 1979; DeVellis, 2012; Rattray & Jones, 2005). For the current thesis, this step was addressed by applying evidence-informed guidelines for item creation to the results from the initial literature review and qualitative study (Chapter 5).

***Step 3: Determine the format of measurement.*** Self-report scales typically consist of individual items followed by a series of response options. Various response option formats exist within the literature, with common examples including Thurstone, Semantic Differential, and Likert scales (see DeVellis, 2012 for a succinct review). DeVellis outlines that the selected format should be evidence-informed, consistent with the theoretical orientation of the scale, use non-ambiguous language, and maximise individual differences and variance in response. The other key formatting issue to consider during this stage is the specified item time frame; that is, the period of time respondents should reflect upon when answering each questionnaire item. For the current thesis, the format of the ADES was considered as candidate items were created, to ensure the two were compatible (Chapter 5).

**Step 4: Have the initial item pool reviewed by experts.** After generating a large number of candidate items, DeVellis's next step is to have the pool reviewed by individuals with specialised knowledge. These 'experts' may consist of people knowledgeable in the subject matter and/or members of the intended survey population (Dillman, Smyth, & Christian, 2014). The overarching aim of this review step is to maximise the validity of the scale, with experts serving several purposes including: 1) evaluating how well candidate items accurately assess relevant aspects of the construct of interest; 2) appraising item quality to improve clarity, readability, conciseness, wording, ambiguity etc.; 3) identifying additional ways of capturing the construct of interest; 4) identifying useless item redundancies; and 5) exploring the developmental appropriateness of items (e.g. DeVellis, 2012; Dillman et al., 2014). For the current thesis, both subject matter experts, consisting of psychology and educational researchers, and members of the intended adolescent survey population were consulted to review the candidate ADES items (Chapter 6).

The final four steps of DeVellis's framework refer to the procedures and analytical techniques used to evaluate the scale's psychometric properties. For the current thesis, the methods utilised to evaluate the ADES were based on an evidence-informed synthesis of DeVellis's guidelines and the wider psychometric literature. These procedures are described in Chapter 7.

**Step 5: Consider the inclusion of validation items.** There are a variety of ways in which the validity of a scale can be assessed, however, most methods broadly focus on determining if the scale a) is associated with other measures designed to measure the same thing; and b) relates as expected with other measures of similar and dissimilar constructs (Churchill, 1979). DeVellis argues that rather than conducting a separate validation study after establishing the final scale, it is pragmatic to include and administer

relevant validation items during the initial development studies. As such, during this stage, scale developers should consider the theoretical nomological network<sup>6</sup> of the phenomena of interest to identify the constructs most useful in assessing the validity of the scale.

**Step 6: Administer the items to a development sample.** After deciding which validity items to include in the larger questionnaire, these are delivered alongside the candidate scale items to a large, representative sample.

**Step 7: Evaluation of the items.** Initial evaluation involves the examination of individual item performance statistics, such as item distributions. In this way, items with deficient psychometric properties can be identified and screened for deletion from the scale.

**Step 8: Optimise the scale length.** Generally, longer scales place greater burden on the respondent and are negatively related to response rate and quality of data (DeVellis, 2012; Galešić, 2002). However, DeVellis (2012) outlines that shorter scales tend to be weaker, unstable, and less reliable than those with more items. As such, during the final stage of scale development, DeVellis outlines that scale length must be optimised to appropriately balance brevity with reliability. Broadly, scale optimisation involves identifying the items with the weakest psychometric properties and analysing the effect of their deletion on the reliability of the total scale. The key analytic method used during this stage is factor analysis, which examines how scale items co-vary to infer the nature of the underlying latent variable (DeVellis, 2006, 2012).

Once the scale has been suitably optimised, the two key CTT-scale properties, reliability and validity, must be considered. Multiple indices exist to assess these

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<sup>6</sup> i.e. the conceptual map of how the phenomenon of interest relates to other similar and dissimilar constructs (DeVellis, 2012; MacKenzie et al., 2005)

psychometric properties; Chapter 7 describes and justifies the methods used in developing of the ADES.

As outlined in the introductory chapter, in addition to addressing the current gap between theory and measurement, one of the primary contributions of developing a holistic stress scale is the ability to provide a balanced investigation of the clinical effects of stress on mental health. As such, the final stage of the current thesis involved using the newly developed ADES to investigate the relationships between distress, eustress, and psychological wellbeing. In addition to the clinical relevance of this investigation, within the overall thesis aim of scale development this study provided initial evidence for the predictive validity of the ADES (DeVellis, 2012).

### **2.3.3 Overview of Research Methods and Structure of the Current Thesis**

Data collection and analysis for the current thesis was purposefully organised to reflect and adhere to the eight steps outlined in DeVellis's (2012) framework. Following these steps, the newly developed ADES was used to investigate relationships between the constructs of interest and conceptually related variables. The thesis is organised into five major sections, moving from defining the constructs, to creating, reviewing, and evaluating the scale items, and finally to using the novel scale. This structure has been summarised in the Thesis Overview (pp. xix - xx) and is explained in more detail in Table 6 (continued pp. 63 - 64). Each included section contributes to the overall thesis aim of developing a holistic self-report measure of adolescent stress; however, the constituent papers also have distinct, self-contained research questions and implications for the broader psychological literature, which are outlined in the relevant chapters.



Table 6

*Structure of the Current Thesis According to DeVellis's (2012) Framework for Scale Development*

Section	Thesis Chapter	Paper Status	Aim • Methods	DeVellis (2012) Framework Step
<b>Define</b>	1: Introduction		Overview of the clinical relevance of stress in adolescence. Review existing measures of adolescent stress. • Literature Review Provide rationale for the research.	
	2: Theoretical Paradigm and Methodological Framework		Describe theories and methods used in the thesis.	
	3: Defining Distress and Eustress		Define and articulate the constructs of distress and eustress, based upon a synthesis of the prevailing theories. • Literature Review	1) Determine clearly what you want to measure
	4: A Qualitative Examination of the Indicators of Distress and Eustress in Adolescence	Paper 1 <i>Published</i>	Identify observable physiological, behavioural, and psychological indicators of the stress response. • Qualitative; Semi-structured interviews • Thematic Analysis	
<b>Create</b>	5: Creating the Adolescent Distress-Eustress Scale		Generate an initial pool of candidate items that reflect the salient observable indicators. Determine scale modality and format for measurement. • Application of evidence-informed guidelines	2) Generate an item pool 3) Determine the format for measurement

(Continued on next page)

Table 6 continued.

Section	Thesis Chapter	Paper Status	Aim • Methods	DeVellis (2012) Framework Step
<b>Review</b>	6: Reviewing the Adolescent Distress-Eustress Scale		Refine, improve, and combine candidate items to form a cohesive preliminary scale. • Subject matter expert review, readability review, qualitative cognitive interview review	4) Have the initial item pool reviewed by experts
<b>Evaluate</b>	7: Evaluation of the Adolescent Distress-Eustress Scale	Paper 2 <i>Published</i>	Optimise and evaluate the performance of the preliminary scale in appropriately large and representative samples of adolescents. • Quantitative; Online surveys • Factor Analysis, Regression Approaches	5) Inclusion of validation items 6) Administer items to a development sample 7) Evaluate the items 8) Optimise scale length
<b>Use</b>	8: A Holistic Understanding of the Effect of Stress on Adolescent Wellbeing	Paper 3 <i>Published</i>	Investigate the relationships between the focal constructs (distress and eustress) and wellbeing using the optimised scale, providing a balanced understanding of the impact of stress on adolescent psychological health. • Quantitative; Online survey • Conditional Process Analysis using PROCESS	
	9: Overall Discussion		Synthesise thesis findings and summarise their significance and contribution to the field. Outline clinical implications of research findings. Discuss strengths, limitations, and future directions.	

### **2.3.3.1 Key methodological premise: Collaborative, inclusive research**

Compas et al. (1987) outline that “the views of adult professionals and researchers may not accurately reflect the experience of children and adolescents because they are hindered by differences in age, by the limits of existing knowledge in the field, by theoretical biases” (p. 534). As such, any attempt to understand stress among adolescents must be inclusive, placing their ideas and accounts at the centre and being grounded in their lived experience (Compas et al., 1987; J. Mason & Danby, 2011; Redmond et al., 2016). Therefore, the research methods for the current thesis were built on the key premise that young people have unique perspectives, developmental contexts, and experiences and are the foremost experts in their own lives (e.g. Braun & Clarke, 2013; J. Mason & Danby, 2011).

Historically, research has positioned young people primarily as subjects, often seeking proxy reports on outcomes from parents or other relevant adults (e.g. de Leeuw, Borgers, & Smits, 2004; J. Mason & Danby, 2011). However, in 1989 the United Nations formally recognised the importance of hearing young people’s voices, with the Convention on the Rights of the Child stating that:

Parties shall assure to the child who is capable of forming his or her own views the right to express those views freely in all matters affecting the child, the views of the child being given due weight in accordance with the age and maturity of the child (Article 12).

Since then, a paradigm shift has occurred whereby research has increasingly moved from focussing on young people as subjects to accepting them as individual actors in their own right (de Leeuw et al., 2004; J. Mason & Danby, 2011). Aligned with this, the South Australian Department for Education and Child Development (2014) Strategic Plan highlights an ongoing aim to engage with young people to ensure that their “voices are

being heard and incorporated into our decision-making and teaching and learning processes” (p. 8).

So called ‘child-inclusive’ research methods (J. Mason & Danby, 2011) have been shown to have several benefits. First and foremost, as adults may lack appropriate insight into unique developmental contexts of childhood and adolescence, ensuring young people are key informants in matters effecting them leads to better decision-making and outcomes (Landsdown, 2011; Redmond et al., 2016). Furthermore, empirical evidence suggests that involvement in child-inclusive practices contributes to young people’s personal and socio-political development (E. Ozer & Douglas, 2013) and is associated with growth of agency, belonging, and competence (Mitra, 2004). With regard to measurement, DeVellis (2012) outlines that involving intended respondents in scale creation ensures that the researcher’s theoretical constructs align with the target population’s experience and that the scale utilises age- and context-appropriate language.

With these benefits in mind, the current thesis sought to communicate and collaborate with young people across the key stages of the ADES’s development. As such, the perspectives of adolescents were used to conceptualise stress and create an entirely new measure, rather than adapting existing adult scales (Patrick et al., 2010). To this end, qualitative approaches (detailed in Chapter 4 and Chapter 6), were utilised to define the operationalisable effect indicators of stress and to create and review the ADES. Further, in delivering the large-scale quantitative surveys required to evaluate and use the scale (Chapter 7 and Chapter 8), a variety of schools were invited to participate to ensure that a broad range of socio-educationally diverse adolescents were able to take part in the research.

Critics of child-inclusive research argue that young people lack the competence or experience to appropriately participate. However, the United Nations Children's Fund (UNICEF) outlines that provided the methodology is suitably adapted to meet relevant developmental needs, all young people are able to adequately express themselves and participate in issues that are relevant to them (Landsdown, 2011). Previous psychometric literature has shown that young people are able to provide scale developers with valuable information (e.g. de Leeuw et al., 2004; Drennan, 2002; Zukerberg & Hess, 1996) and incorporating young people's perspectives in scale development has been used successfully in the creation of many psychological measures (e.g. Compas et al., 1987; Kern et al., 2016; Redmond et al., 2016). However, caution is warranted to recognise the boundaries of adolescents' expertise. As DeVellis (2012) outlines, while the target population for a scale is "uniquely qualified to provide insights into their own understanding of a questionnaires contents" (p. 188), the researcher retains expertise in the technical psychometric details of scale construction.

### ***2.3.3.2 Participants and recruitment***

#### ***2.3.3.2.1 Recruitment sites***

All participants for the current thesis were recruited from South Australian educational institutions. School education in South Australia is divided into 3 stages: 1) Primary school, running for seven years starting at Reception (5 years old) through to Year 6 (11 years old); 2) Secondary school, running for four years from Years 7 to 10 with children aged between 12 and 15; and 3) Senior school, running for Years 11 and 12, with young people aged between 16 and 18 (Study in Australia, 2019). There are two broad categories of schools: government schools, which are free to attend and funded by the Australian Government, and non-government schools, which charge attendance fees and can be further separated into independent schools and faith-based schools (Australian

Department for Education and Training, 2019). Schools are ranked according to the Index of Community Socio-Educational Advantage (ICSEA), a metric designed by the Australian Curriculum Assessment and Reporting Authority (ACARA; 2019a) to quantify the relative average level of educational advantage of a school's student population. Calculation of the metric takes into account parents' occupation and education level and the school's remoteness and enrolment of Indigenous students. The average ICSEA score is defined as a value of 1000, such that scores below this value suggest students are relatively socio-educationally disadvantaged and vice versa scores above this value suggest relative socio-educational advantage. Subsequent to schooling, tertiary education options include higher education institutions, such as universities, or vocational education/training (Study in Australia, 2019).

Participants were recruited from four Adelaide educational institutions: a government school, two independent schools, and a tertiary university. These recruitment sites, introduced in more detail below, were selected to ensure that participants captured the cross section of South Australian education options, included a range of ICSEA values, and represented the entire adolescent age range. Additionally, each of the institutions had a pedagogical engagement with Positive Psychology, described for each site below.

#### 2.3.3.2.1.1 Blackwood High School

Blackwood High School (BHS) is a government secondary-to-senior school, teaching students in Years 8 to 12. In 2018, BHS had a ICSEA value of 1056, similar to the Australian average (ACARA, 2019b). Of the 848 students enrolled full time at BHS in 2018, 47% were female, 1% were Indigenous, and 12% came from a language background other than English. (ACARA, 2019b). Participants were recruited from Years 8 to 11.

Leaders and teachers at BHS are trained in the fundamental principles of Positive Education and involved in the implementation of 'Wellbeing Initiatives' to secondary school students. BHS has worked in partnership with the University of Adelaide<sup>7</sup> since 2014 to measure the wellbeing of students and evaluate the efficacy of implemented programs.

#### 2.3.3.2.1.2 Pembroke School

Pembroke is an independent, non-denominational Christian, day and boarding school, teaching students from Reception to Year 12 and incorporating an Early Learning Centre (equivalent to pre-school, with children aged 4 years). In 2018, Pembroke had an ICSEA value of 1182, well above the Australian average (ACARA, 2019b), suggesting that the student population is relatively socio-educationally advantaged. Of the 1,585 students enrolled full time at Pembroke in 2018, 48% were female, 1% were Indigenous, and 14% came from a language background other than English (ACARA, 2019b).

Participants were recruited from Years 7 to 12.

Pembroke integrates the theory and interventions associated with Positive Education into the student health curriculum and the school's executive plans. Year 8 students at the school also participate in an eight-week program focussing on emotional wellbeing and resilience.

#### 2.3.3.2.1.3 University of Adelaide

The University of Adelaide is a public tertiary education and research institution. Of the 26,930 students enrolled at the University of Adelaide in 2017, 49% were female, 1% were Indigenous, and 28% were International students (The University of Adelaide, 2019). Participants were recruited from the undergraduate Psychology course via the

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<sup>7</sup> i.e. the institution where the current PhD was completed.

internal Research Participant System, a system whereby first year students participate in research in order to gain course credit.

The University of Adelaide incorporates Positive Psychology theory and intervention as part of the student Counselling Support Service. Further, in 2012 the University engaged with ongoing Positive Psychology projects as part of Martin Seligman's tenure as Adelaide's 'Thinker in Residence' (see Seligman, 2013 for outcomes of this program).

#### 2.3.3.2.1.4 University Senior College

At the outset of the current research, the intention was to collect data from only the three above institutions. However, during 2018, several major changes occurred at these schools. Due to changes in timetable and executive staff, Pembroke School was no longer able to deliver the questionnaire to Year 11 and 12 students. Additionally, major staffing changes at BHS resulted in all staff committed to the research partnership departing the school. Re-establishing the working relationship with the new wellbeing team delayed data collection and resulted in a smaller number of students, predominantly from Years 8 and 9, being able to take part. These circumstances necessitated engaging with an additional school to take part in data collection for Paper 3 (Chapter 8) to maintain a sufficiently large and age-varied sample.

To ensure the sample for Paper 3 represented the full age-range of adolescents, University Senior College (USC) was approached to participate. USC is an independent high school for students in Years 11 and 12. At the time of writing, the school did not have current data available for the ICSEA, although 2013 data suggested a value slightly above the Australian average (1071; AU School, 2014). Of the 406 students enrolled full time at USC in 2018, 58% were female and 1% were indigenous (ACARA, 2019b). Data were not available as to students with a language background other than English.



Anecdotally, school leaders suggested that students were from a wide range of socio-economic and cultural backgrounds. USC students only took part in data collection for Paper 3 and recruitment occurred from the entire school population.

USC incorporates Positive Education theory as part of Pastoral Care and a Mentoring Program, in which students participate in individual sessions with a staff mentor and attend group presentations focussing on wellbeing and personal strengths. The school counselling service also incorporates evidence-based, Positive Psychology interventions

#### *2.3.3.2.2 Recruitment methodology*

For the qualitative aspects of the thesis (i.e. Paper 1, see Chapter 4, and Review, see Chapter 6), participants were selected from a pool of volunteers. Both projects were advertised to eligible school students via assemblies and to University students via the Research Participation System, and students were asked to indicate their interest in participating. Participants were then selected based on a selection matrix of school type, age, gender, and academic achievement with input from educational leaders (described in detail in Section 4.3.3.2.2, p. 114).

For the quantitative aspects of the thesis (Paper 2, see Chapter 7, and Paper 3, see Chapter 8), all eligible students at each educational institution were invited to participate in the online surveys. At the schools, dedicated classes were set aside for questionnaire completion, while University students accessed the link via the Research Participation System. School students without parental consent and those electing not to participate in the survey completed an age-appropriate alternative activity (e.g. quiet reading, brain training, online games) during questionnaire administration.

For all recruitment, age-appropriate information packs were provided to participants, which included study information and aims, a sheet outlining relevant

contacts for the project and the independent complaints procedure, and a consent form. Additionally, at the schools, parents also received information and consent forms and staff were provided with information sheets. At all data collection points, participants were able to withdraw at any time without penalty.

#### *2.3.3.2.3 School and participant feedback*

A close working relationship was maintained with the schools over the course of the thesis, with results continually fed back to teachers, executive teams, and the wider school community. For each round of data collection, the thesis author provided school staff with a comprehensive report outlining relevant results and their significance. The author also facilitated school assemblies and wrote newsletter articles regarding results and implications to provide study feedback to the participants and their parents. Participants from the University were also given the option of electing to receive feedback on the outcomes of the study. Additionally, the researchers attended numerous meetings with the executive teams at each school outlining the implications of the research for their wellbeing curriculum. In particular, results from Paper 3 were utilised to inform the USC wellbeing and mentoring program. In consultation with the USC's student counsellor and Dean of Student Experience, the author provided input on a pastoral care module regarding stress and wellbeing and presented an interactive workshop for interested parents.

#### **2.3.3.3 General ethical considerations**

All research complied with the National Health and Medical Research Council's Statement on Ethical Conduct in Human Research (2018). Ethical approval for all studies was sought from the University of Adelaide School of Psychology: Human Research Ethics Subcommittee. Additional ethical approval from the Department of Education and Child Development was required for data collection at the government high school (i.e. BHS).

Approval numbers for each of the included investigations are outlined in the relevant chapters.

As data collection involved exclusively adolescent participants, many under the age of 18, several specific ethical considerations were taken into account:

- In line with instructions from the relevant ethics committees and consultation with the schools, all participants were aged at least 13 at the time of their participation.
- All participants were required to give active personal consent before they participated in any stage of the project. Further, all school-based participants were required to have additional parental consent.
- Due to differences in the ethical requirements at government and non-government schools, parental consent was managed at Pembroke and USC via an opt-out system, whereas parents at BHS were required to give active, opt-in, consent.
- Only the thesis author had direct contact with adolescent participants and maintained all relevant Working with Children screening clearances.
- To ensure the research was conducted in a way that provided for the young people's safety, emotional and psychological security, and wellbeing, a counsellor and/or psychologist was on hand during all school-based data collection and tertiary students were directed towards the relevant University counselling and disability services. Participants were also provided with information as to how to access appropriate phone-counselling organisations.
- To mitigate the time burden of the research, the qualitative interviews and quantitative questionnaires were restricted to a maximum of 60 minutes (i.e. one school class).

- While the research sought to maintain the privacy and confidentiality of all participants, appropriate adverse events procedures were put in place for the event that a participant disclosed sensitive information relating to risk of harm to self or others. Participants were made aware that if they made such a disclosure, relevant educational leaders would be consulted and a report would be made to the Child Abuse Report Line or Mental Health Triage Service as relevant. No participant made such a disclosure over the course of the research and this adverse events procedure was not required.

These general ethical considerations ensured the research complied with the University of Adelaide's Child-Safe Environment Policy. This Policy defines a set of principles to ensure research conducted at the University is in accordance with the South Australian Children's Protection Act and provides a respectful and protective environment for young participants. Any specific ethical considerations for each investigation are discussed in more detail in the relevant chapters.

### CHAPTER 3. DEFINING DISTRESS AND EUSTRESS

The first step in developing the ADES was to clearly define and articulate the constructs of distress and eustress. In describing his scale development framework (see Section 2.3.2, p. 57), DeVellis (2012) states that a scale must be “well grounded in the substantive theories related to the phenomenon to be measured” (p. 73). He therefore stipulates that scale developers identify a theoretical model, which includes well-formulated definitions of the constructs of interest, to serve as a guide to scale development. However, there is currently little consensus across the psychological literature as to the conceptualisation and definition of stress (e.g. Burton & Hinton, 2010; Le Fevre et al., 2003). This confusion is compounded by the polysemous nature of the term, with the disciplines of psychology, medicine, biology, sociology, and engineering using ‘stress’ to mean different things (C. L. Cooper & Dewe, 2004; Lazarus, 1993; Le Fevre et al., 2003; Rice, 1999).

While the term ‘stress’ has been used since approximately the 14<sup>th</sup> Century to describe a milieu of broadly negative emotions, it first appeared in *Psychological Abstracts* as late as 1944 (F. Jones & Bright, 2001b; Lazarus & Folkman, 1984). Interest in the construct accelerated in the context of World War II, with researchers investigating the effect of intense combat stress on returning soldiers (Lazarus, 1993). At the time, these negative outcomes were referred to as ‘shell shock’ but are now better understood as PTSD. In general, lay definitions conform to these historical negative connotations, tending to conceptualise stress as something maladaptive and undesirable (e.g. Hargrove, Becker, & Hargrove, 2015; Healey, 2002; F. Jones & Bright, 2001b; F. Jones & Kinman, 2001). However, contemporary theoretical models emphasise that stress is not inherently maladaptive and can be differentiated into both negative and positive aspects (i.e. distress and eustress).

Over the past eight decades, numerous stress theories have proliferated in the literature. Chapter 3 critically reviews the prominent theories of psychological stress with the aim of generating clear and concise definitions of distress and eustress. The intention of this chapter is not to review all proposed stress theories, but instead to highlight those models most commonly referred to in the psychological literature and providing the best formulated conceptualisations of distress and eustress. These models, while sharing significant similarities and overlap, differ in their specific conceptualisations of stress and each approach presents its own strengths and weaknesses. The chapter concludes by synthesising across these prevailing theories to propose a novel ‘partial-consensus’ definition of stress, which was subsequently used to guide the development of the ADES.

### **3.1 Classic Stress Theory: Hans Selye**

Hans Selye is considered the ‘father of stress research’ (e.g. Jarinto, 2011). A prolific researcher, Selye extended his theories in numerous influential works between 1936 and 1983 (e.g. 1936, 1950, 1955, 1956, 1964, 1974, 1975, 1976, 1980, 1983), but did not, however, use the term ‘stress’ until 1946 (D. Bartlett, 1998). He is suggested to be one of the first researchers to name, define, and examine the construct of ‘eustress’ (e.g. Le Fevre et al., 2003; Nelson & Simmons, 2003).

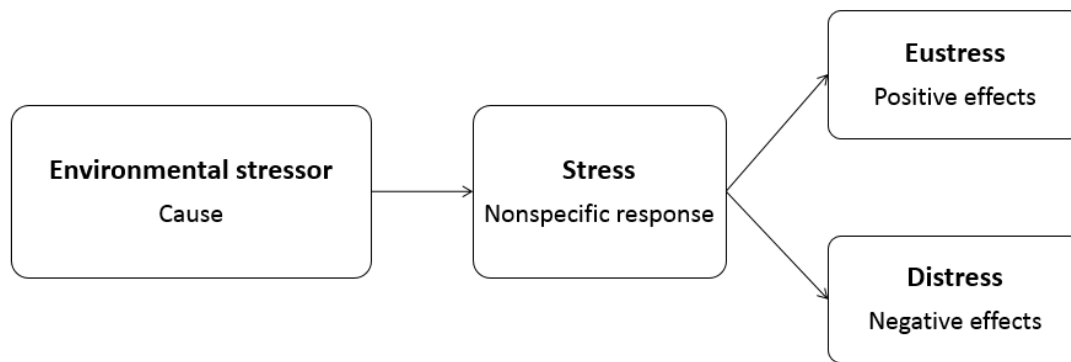
Selye defined stress as the “non-specific response of the body to the demands made upon it” (1974, p. 14). A demand, or ‘stressor’, was considered to be any stimuli that disrupts equilibrium and requires psychological or physical mobilisation (Aldwin & Stokols, 1988; Le Fevre et al., 2003; Rice, 1999; Snodgrass et al., 2016). He therefore considered that as the body produces a response to every demand, stress is ubiquitous and unavoidable. Selye (1974) termed the manifestation of stress in the body as the

'General Adaptation Syndrome' and conceptualised it as consisting of 3 stages (Rice, 1999):

- 1) Alarm: Exposure to stressors triggers the autonomic nervous system.
- 2) Resistance: The body copes with and adapts to the stressors.
- 3) Exhaustion: Continued resistance leads the body to exhaust its energy resources.

These stages were empirically derived and have been extensively tested in the literature.

Crucially Selye's conceptualisation delineated the stress response into two aspects: the negative response, termed 'distress', and the positive response, termed 'eustress' (see Figure 2). Distress was defined as "damaging or unpleasant stress" (Selye, 1974, p. 31) while eustress was "pleasurable stress" (Selye, 1979, p. 27). Distress and eustress were considered to be subjective and dependent upon the individualised interpretation of the demand (Heikkila, Ainasoja, & Oksman, 2015; Le Fevre et al., 2006; Le Fevre et al., 2003). Indeed, Selye suggested that the same demand could be perceived as a source of eustress and distress by different people, or by the same person at different times. Selye argued that one can learn to react to stressors with positive emotions, such as gratitude, hope, or good will, which is likely to maximise eustress and minimise distress (Heikkilä & Mattila, 2018).



*Figure 2.* Selye's conceptualisation of stress (adapted from O'Sullivan, 2011).

Selye's theories, while pioneering, have several notable limitations. Firstly, Selye's background as a biologist led to his theories being principally developed based on physiological experiments conducted with animals, predominantly rats, and being heavily influenced by biological terms (D. Bartlett, 1998; F. Jones & Bright, 2001b). The relevance of these theories to human psychological stress is therefore questionable (D. Bartlett, 1998). Secondly, it is argued that the model is overly non-specific, in that every demand on the individual produces a stress response, regardless of whether the stressor is relevant to that individual (Healey, 2002; Le Fevre et al., 2003). Further, it has been suggested that Selye's definition of a stressor as any demand that brings forth a stress response is circular (F. Jones & Bright, 2001a). Additionally, Selye did not clearly outline the nature of the psychological or physiological differences between eustress and distress (Lazarus, 1993). Finally, by his own admission, Selye suggested that the terminology used to describe the model was inconsistent and confusing as English was not his first language (F. Jones & Bright, 2001b). Overall, while contemporary theorists recognise that the stress process is substantially more complex than the concepts advanced by Selye, his work remains immensely influential (e.g. C. L. Cooper & Dewe, 2004; F. Jones & Bright, 2001b; Lazarus, 1993).

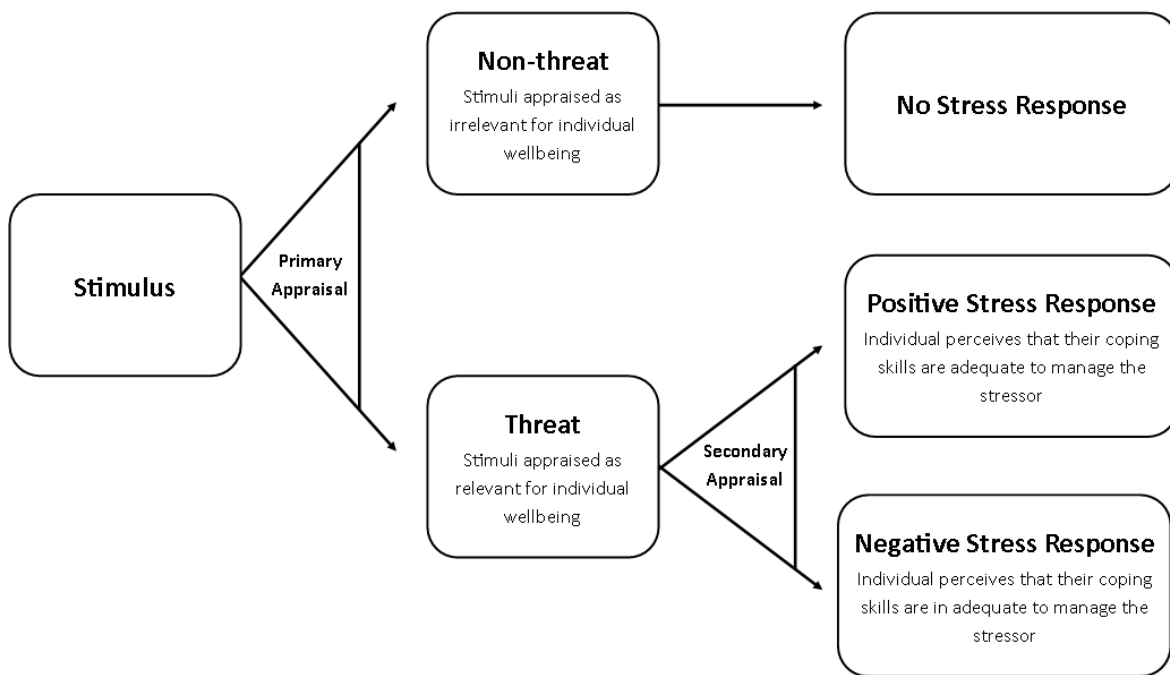


## **3.2 Prominent Contemporary Stress Theories**

### **3.2.1 Transactional Approach**

The Transactional Approach, associated with the work of Richard Lazarus and colleagues (e.g. Folkman et al., 1986; Lazarus, 1966, 1991, 1993; Lazarus & Folkman, 1984; Lazarus, Kanner, & Folkman, 1980; Lazarus & Launier, 1978; C. A. Smith & Lazarus, 1993), is arguably the current dominant theory of psychological stress. Within this approach, stress is defined as “a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her wellbeing” (Lazarus & Folkman, 1984, p. 19). The emphasis of the approach is that stress is a ‘transaction’ between the person and the environment, highlighting the importance of individual appraisal (e.g. Lazarus & Folkman, 1987). In addition to theoretical literature, this model has been extensively examined in empirical studies (e.g. Kozusznik et al., 2015; Lazarus, 1990; Muurlink, Wilkinson, Peetz, & Townsend, 2012).

The Transactional Approach, summarised in Figure 3, proposes that environmental stimuli are appraised in two steps. During the primary appraisal individuals assess the motivational relevance of the stimuli and consider the importance of the situation or event for their individual wellbeing (e.g. Gall & Evans, 1987; Lazarus, 1990, 1993). If a stimulus is subjectively appraised as irrelevant, there is no stress response.



*Figure 3.* The stress response as defined in the Transactional Approach (adapted from Lazarus & Folkman, 1984).

If the individual appraises the stimuli as relevant to their wellbeing, this incites a stress response and leads to the secondary appraisal. During the secondary appraisal, the individual assesses their ability to cope with the stimuli, or 'stressor' (e.g. Gall & Evans, 1987; Hargrove et al., 2015; Strack & Esteves, 2015). Coping is the "constantly changing cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person" (Lazarus & Folkman, 1984, p. 141) and can aim to manage, eliminate, or change the stressor ('problem-focussed') or the emotional tension associated with the stressor ('emotion-focussed'; Patterson & McCubbin, 1987; Sheu et al., 2002). When an individual perceives their coping skills are inadequate to manage the stressor they are said to experience 'negative stress'. On the other hand, if an individual perceives their coping skills are adequate, then they experience 'positive stress'. These two stress responses are considered to be distinct constructs that can be experienced simultaneously, rather than

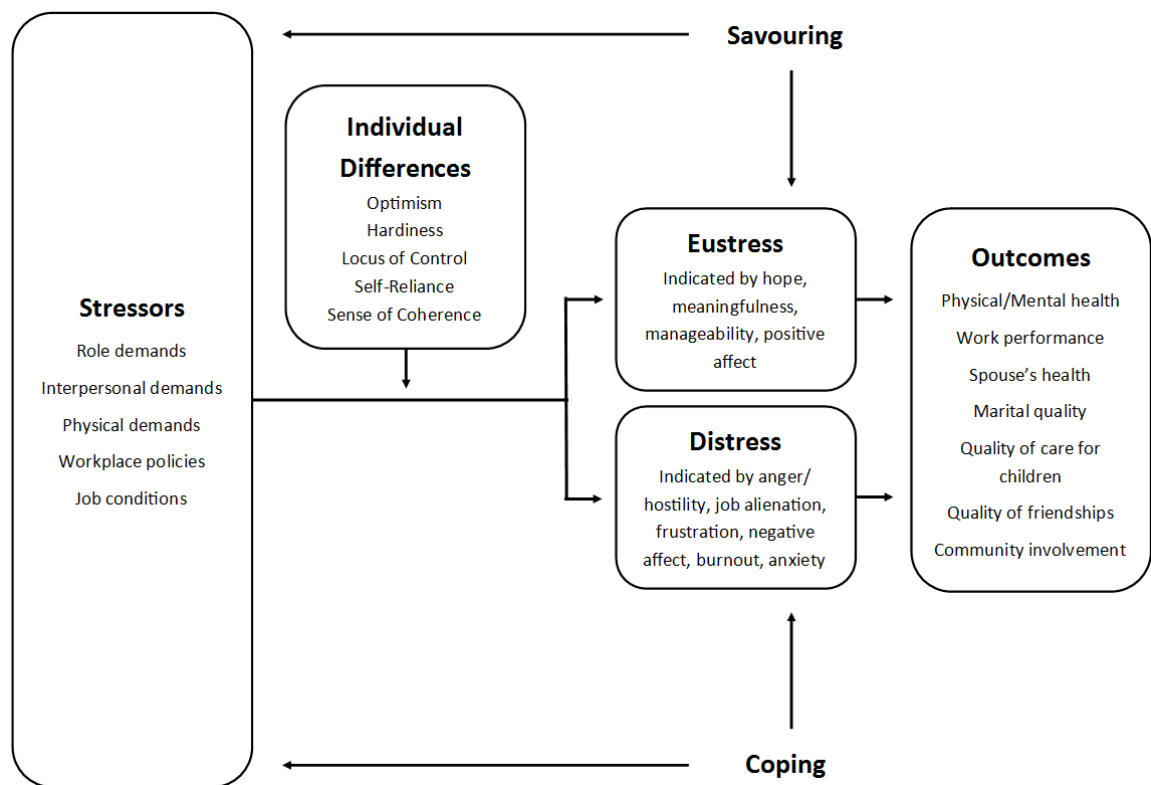
as ends of a continuum. Secondary appraisals and the resultant stress response are considered to be subjective and dependent upon the individualised perceptions regarding the personal and environmental resources available to face the stressor (D. Bartlett, 1998; de Anda et al., 2000; Lazarus, 1990; Quinones, Rodríguez-Carvajal, & Griffiths, 2016; Verhaeghe et al., 2006).

The Transactional Approach has broad intuitive appeal and is arguably the most comprehensive stress theory (F. Jones & Kinman, 2001; H.-F. Wang & Yeh, 2005). The model conceptualises stress as relational and individual, rather than as a generalised response to environmental stimuli, acknowledging the importance of individual differences (D. Bartlett, 1998; B. D. Edwards et al., 2014; Fairchild & MacKinnon, 2009; F. Jones & Kinman, 2001; Nelson & Simmons, 2003; Quinones et al., 2016; Rice, 1999) . However, existing research has failed to clarify the extent to which appraisals relate to culture. Hobfoll (2001), for example, argues that the model is “a reflection of the cultural, Western bias that champions the crystallised self and sees it as divisible from the embedded self” (p. 341). Further, although the Transactional Approach acknowledges the experience of positive stress, Lazarus’s focus was predominantly on negative stress and associated coping methods (Nelson & Simmons, 2003; Simmons & Nelson, 2001; Snodgrass et al., 2016).

### **3.2.2 Holistic Stress Model**

To counteract the negative focus of Lazarus’ approach, Nelson and Simmons (e.g. 2003; 2004, 2011) proposed the Holistic Stress Model with the intention of positively expanding the focus of stress research. As with the Transactional Approach, the Holistic Model (Figure 4) proposes that individuals cognitively appraise stressors in respect to their effect on their wellbeing (Hargrove, Nelson, & Cooper, 2013; Simmons & Nelson, 2001). Eustress is defined as a positive psychological response to a stressor and reflects

the extent to which demands are appraised to benefit the individual and/or enhance wellbeing (Hargrove et al., 2013; Kung & Chan, 2014; Simmons & Nelson, 2001). Distress is the negative psychological response to a stressor and reflects the extent to which demands are perceived to be undesirable or harmful (Kung & Chan, 2014; Simmons & Nelson, 2001). The two stress responses are considered as distinct constructs that can be experienced simultaneously in response to the same stressor (McGowan et al., 2006; Nelson & Cooper, 2005; Nelson & Simmons, 2003). The Holistic Model also explicitly considers salient individual differences predicting stress responses (Hargrove et al., 2013; Kung & Chan, 2014; Nelson & Simmons, 2003), proposing that dispositional optimism, hardiness, locus of control, self-reliance, and sense of coherence influence the stress appraisal (Nelson & Simmons, 2003).



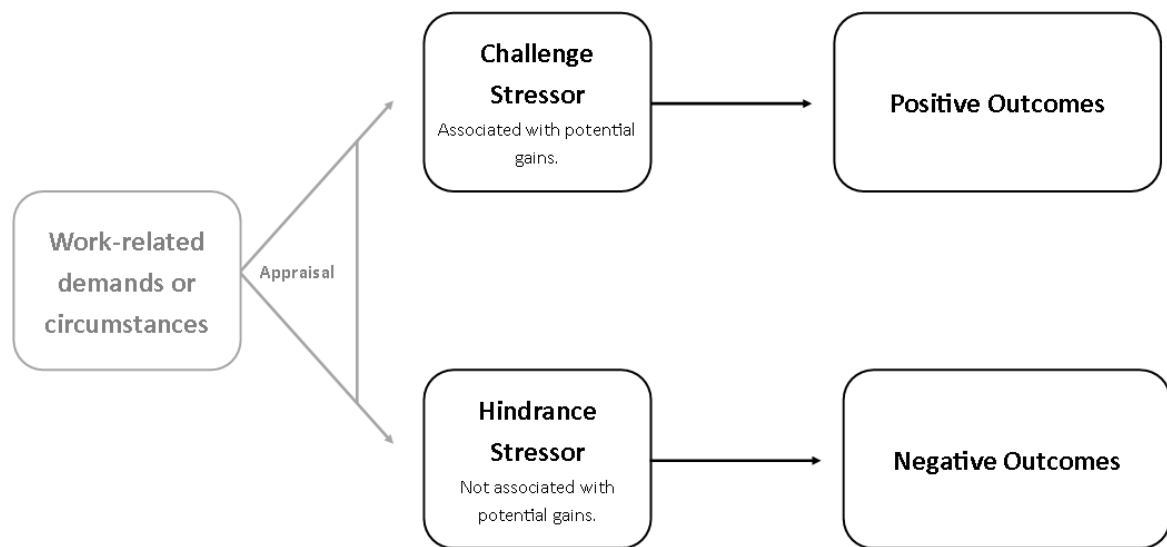
*Figure 4.* The stress response as defined in the Holistic Stress Model (adapted from Nelson & Simmons, 2003).

The Holistic Model outlines that eustress and distress are distinguishable by affective state (McGowan et al., 2006; Nelson & Simmons, 2003; Simmons & Nelson, 2001). Distress is indicated by the presence of negative psychological states, including anger, alienation, frustration, negative affect, burnout, and anxiety. Eustress on the other hand is indicated by positive psychological states, including hope, meaningfulness, manageability, and positive affect. As outlined in Section 1.3.1.2.3 (p. 33), it has been suggested that these indicators can be used as proxy measures of the stress response. Distress and eustress are assumed to differentially effect valued outcomes, including physical health, mental health, and work performance (Nelson & Simmons, 2003). The model also proposes the concept of ‘savouring’, a mechanism intended to enhance and prolong eustress and considered to be the parallel of coping with distress (Hargrove et al., 2013; Heikkila et al., 2015; Nelson & Cooper, 2005; Nelson & Simmons, 2003).

The Holistic Model positively shifts the focus of stress theory from largely negatively-focussed models to a more balanced understanding (Parker & Ragsdale, 2015). Further, it offers a more complete picture than the Transactional Model (Hargrove et al., 2013), acknowledging salient individual differences in stress appraisal and the role of savouring. However, while the model has some empirical support, it has not been examined in its entirety (Hargrove et al., 2013). Additionally, the model was proposed within the paradigm of organisational psychology, focussing on work related stressors. The broader applicability of this model to a wider context, and particularly to an adolescent population, is therefore debateable.

### **3.2.3 Challenge-Hindrance Framework**

In 2000, Cavanaugh, Boswell, Roehling, and Boudreau, questioned why existing organisational psychology literature reported modest or no relationships between organisational stress and job dissatisfaction, job search behaviour, and other negative work outcomes. Based on 1,866 qualitative interviews with executive organisation managers they consequently proposed the Challenge-Hindrance Framework (Figure 5), which outlined that work stress associated with some stressors, termed 'hindrance-stressors', leads to negative outcomes while stress associated with other stressors, termed 'challenge-stressors', resulted in positive outcomes. The stress response was proposed to be dependent upon the appraisal of the stressor as either a challenge or a hindrance (B. D. Edwards et al., 2014; M. Ozer et al., 2014).



*Figure 5.* The stress response as defined in the Challenge-Hindrance Framework (adapted from Cavanaugh et al., 2000).

Hindrance stressors are “work-related demands or circumstances that tend to constrain or interfere with an individual’s work achievement and that do not tend to be associated with potential gains for the individual” (Cavanaugh et al., 2000, p. 68).

Hindrances are those demands appraised as

- obstacles to growth/personal development (Byron, Peterson, Zhang, & LePine, 2018; Chou et al., 2014; González-Morales & Neves, 2015; Hon et al., 2013; Yuan et al., 2014; Zhu et al., 2017);
- hindering one’s ability to achieve goals (Chou et al., 2014; Yuan et al., 2014);
- harmful (B. D. Edwards et al., 2014);
- obstacles to task achievement (González-Morales & Neves, 2015; Hon et al., 2013; K. Leung, Huang, Su, & Lu, 2011); and,
- reducing motivation (K. Leung et al., 2011; M. Ozer et al., 2014).

Appraising a stressor as being a hindrance results in a negative stress response, as indicated by negative emotion, and are assumed to be associated with poor work outcomes (Cavanaugh et al., 2000; Chou et al., 2014; Hon et al., 2013).

Challenge stressors are “work-related demands or circumstances that, although potentially stressful, have associated potential gains for individuals” (Cavanaugh et al., 2000, p. 68). Challenges are appraised as

- opportunities for personal reward/development and growth (Byron et al., 2018; Chou et al., 2014; González-Morales & Neves, 2015; M. Ozer et al., 2014);
- fulfilling (Hon et al., 2013);
- encouraging of motivation (K. Leung et al., 2011; M. Ozer et al., 2014); and,
- benefiting to career development (Zhu et al., 2017).

Challenging demands are proposed to improve performance, promote achievement, and be associated with positive work outcomes (e.g. Cavanaugh et al., 2000; B. D. Edwards et al., 2014; González-Morales & Neves, 2015). Challenges result in a positive stress response as indicated by positive emotion, wellbeing, and performance (Cavanaugh et al., 2000; Chou et al., 2014; M. Ozer et al., 2014).

While the Challenge-Hindrance Framework recognises the importance of appraisal in determining whether a stressor is a challenge or a hindrance, the majority of research using the model imposes an *a priori* classification upon stressors based on hypotheses about how most people tend to appraise the demand. Specifically, Cavanaugh et al. (2000) proposed that at work, organisational politics, formality and red tape, role ambiguity, job insecurity are hindrance stressors and time pressure, work scope, and high workload/duties are challenge stressors. In this way, the Framework fails to recognise individual differences in the stress response, tacitly assuming that demands represent either a challenge or hindrance for every individual in every situation (B. D. Edwards et al., 2014; González-Morales & Neves, 2015). Further, this *a priori* categorisation confounds environmental stressors with perceptions of those stressors.



(B. D. Edwards et al., 2014). Additionally, while the link between appraisal and outcome was theorised in the original Cavanaugh et al. study, it was not empirically tested.

The Challenge-Hindrance Framework can also be criticised for being based on the results of only one study conducted within a relatively heterogeneous sample (American, 91% male, 96% Caucasian, average age 47). However, the framework has since developed a strong empirical evidence base (e.g. Cavanaugh et al., 2000; Chou et al., 2014; B. D. Edwards et al., 2014; González-Morales & Neves, 2015; Hargrove et al., 2013) and continues to evolve with new research (Hargrove et al., 2015). As with the Holistic Model, the Challenge-Hindrance Framework is focussed on organisational psychology, impacting on its broader applicability.

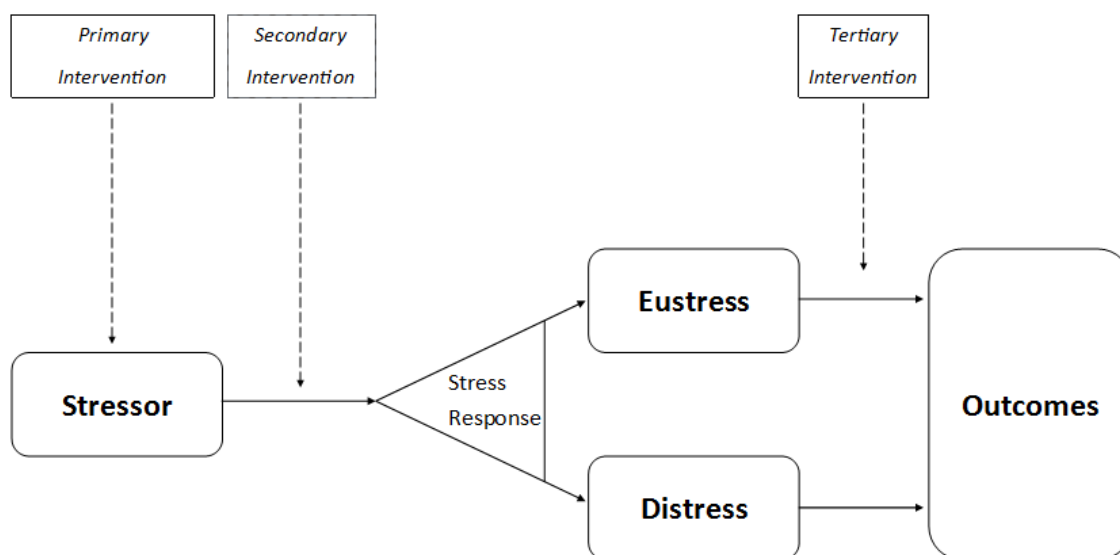
### **3.2.4 Other Stress Models**

The three stress models described above were the most commonly referenced in the reviewed psychological literature. Five additional, less prominent, models were also identified to provide relevant and valuable perspectives on the definition of distress and eustress and are briefly reviewed below.

#### ***3.2.4.1 Theory of Preventative Stress Management Model***

The Theory of Preventative Stress Management Model (TPSMM), associated with the work of Jim and Jonathan Quick and colleagues (e.g. Hargrove, Quick, Nelson, & Quick, 2011; J. C. Quick, Quick, Nelson, & Hurrell, 1997; J. C. Quick et al., 2006; J. D. Quick, Quick, & Nelson, 1998), was proposed to demonstrate how stress can be managed in organisations (Hargrove et al., 2015). In this theory (Figure 6), a stressor is considered to be any stimuli that places a demand on an individual. These demanding stimuli initiate a holistic stress response, which can be positive or negative, includes cognitive, affective, and physiological reactions, and is broadly influenced by individual vulnerability factors and protective mechanisms (Hargrove et al., 2015; Hargrove et al., 2011). Eustress is

defined as the healthy and positive response to demands while distress is the “physiological, behavioural and/or psychological deviation from healthy functioning resulting from a stress response” (J. C. Quick et al., 2006, p. 217). These responses are assumed to lead to a range of outcomes, with eustress associated with positive effects and distress with negative effects (Hargrove et al., 2015; Hargrove et al., 2013; Hargrove et al., 2011). The TPSMM suggests that organisations can intervene at three levels to increase positive outcomes. Primary intervention addresses the stressful stimuli, secondary intervention addresses the response to stressors, and tertiary intervention addresses the outcomes (Hargrove et al., 2015; Hargrove et al., 2011).



*Figure 6.* The stress response as defined in the Theory of Preventative Stress Management Model (adapted from Hargrove et al., 2011).

Key advantages of the TPSMM are its simplicity, clarity, and brevity. Additionally, unlike the Holistic Model, it takes into account the physiological and behavioural aspects of the stress response in addition to the psychological features. However, this model was proposed with the specific purpose of managing stress in organisations, rather than as a

more general theory. As such, there is little empirical evidence investigating the validity of the model itself and its application to a broader context is questionable.

#### **3.2.4.2 *Cybernetic Theory***

In conducting a review of the stress literature, J. R. Edwards and Cooper (1988) proposed Cybernetic Theory, which argues stress is related to the discrepancy between an individual's perceived state and desired state and the importance of this discrepancy to the individual (J. R. Edwards & Cooper, 1988; Le Fevre et al., 2006; Stanton et al., 2014). Distress is defined as "a negative discrepancy between an individual's perceived state and desired state, provided that the presence of this discrepancy is considered important to the individual" (J. R. Edwards & Cooper, 1988, p. 1147). Similarly, eustress is defined as "a positive discrepancy between an individual's perceived state and desire state, provided the presence of this discrepancy is considered important to the individual" (J. R. Edwards & Cooper, 1988, p. 1148). As with above reviewed models, Cybernetic Theory highlights the importance of an individual's subjective perception of the stressor and their appraisal as to the relevance of this demand. However, while these definitions provide useful, simple descriptions of distress and eustress, they do not represent a comprehensive, operationalisable model and there has been limited empirical investigation of the theory.

#### **3.2.4.3 *Conservation of Resources Theory***

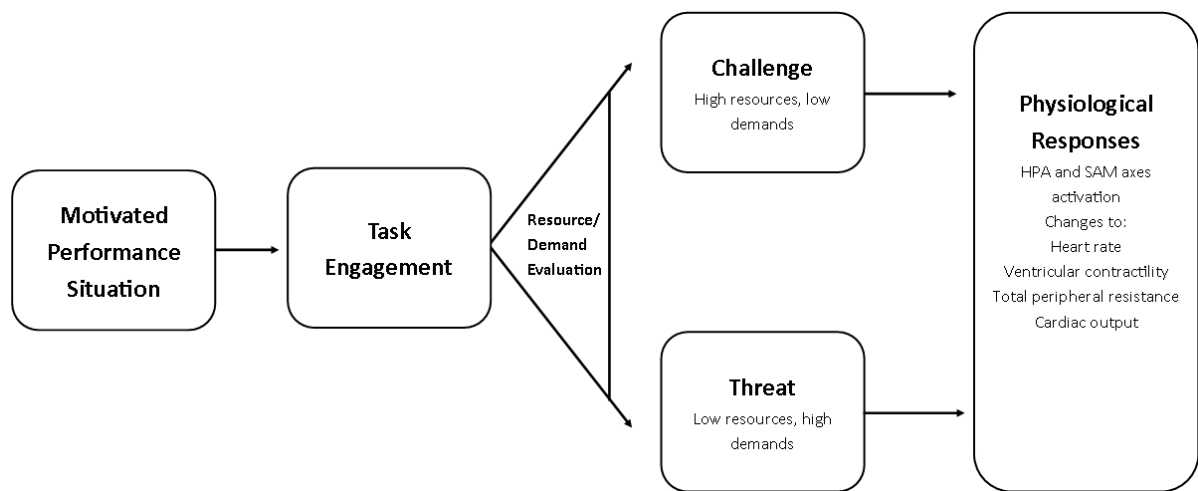
In arguing that previous stress models were overly focused on individualised cognitive appraisals, Stevan Hobfoll (e.g. 2001) sought to place greater emphasis on those aspects of stress shared by individuals with a common biology and culture (Contrada, 2011). In his Conservation of Resources Theory, Hobfoll proposed that individuals "strive to obtain, protect, and foster those things that they value" (2001, p. 341), known as 'resources'. Distress occurs when individuals' resources are threatened

with loss or actually lost, or when individuals fail to gain sufficient resources. Eustress, on the other hand, depends on the gain of resources (Hobfoll, 2001; Merino et al., 2018).

The model further outlines that individuals must invest resources to protect against resource loss, recover from loss, or gain resources and that resources are utilised to offset the negative effects of stress. Those who lack resources are considered to be more vulnerable to resource loss, while those possessing of resources are more capable of gain (Hobfoll, 2001). This theory has limited traction in the literature and has been criticised as having restricted utility due to its general nature and overlap with other theories (Hobfoll, 2001).

#### ***3.2.4.4 The Biopsychosocial Model of Challenge and Threat***

The Biopsychosocial Model of Challenge and Threat (e.g. Blascovich, 2007, 2008; Blascovich & Mendes, 2000; Blascovich & Tomaka, 1996) is based on the Transactional Approach to stress research and integrates biological, psychological, and social levels of understanding. The model (Figure 7) suggests stress is elicited by motivated performance situations, defined as situations in which “individuals must actively perform instrumental responses to reach a goal that is self-relevant or important in some way” (Seery, 2013, p. 638) and that result in task engagement. The subsequent response is posited to be dependent on the individual’s evaluation of both the situational demands and their own personal resources. Challenge is associated with an evaluation of high resources and low demands and, vice versa, threat is associated with evaluated low resources and high demands (Blascovich, 2008; Seery, 2013). These evaluations are suggested to be automatic, rather than deliberate, and are continually updated throughout task engagement (Seery, 2013). These two responses are hypothesised to differentially impact on key physiological responses, including HPA and SAM axis activation and cardiovascular activity (e.g. Blascovich, 2008; Seery, 2013).



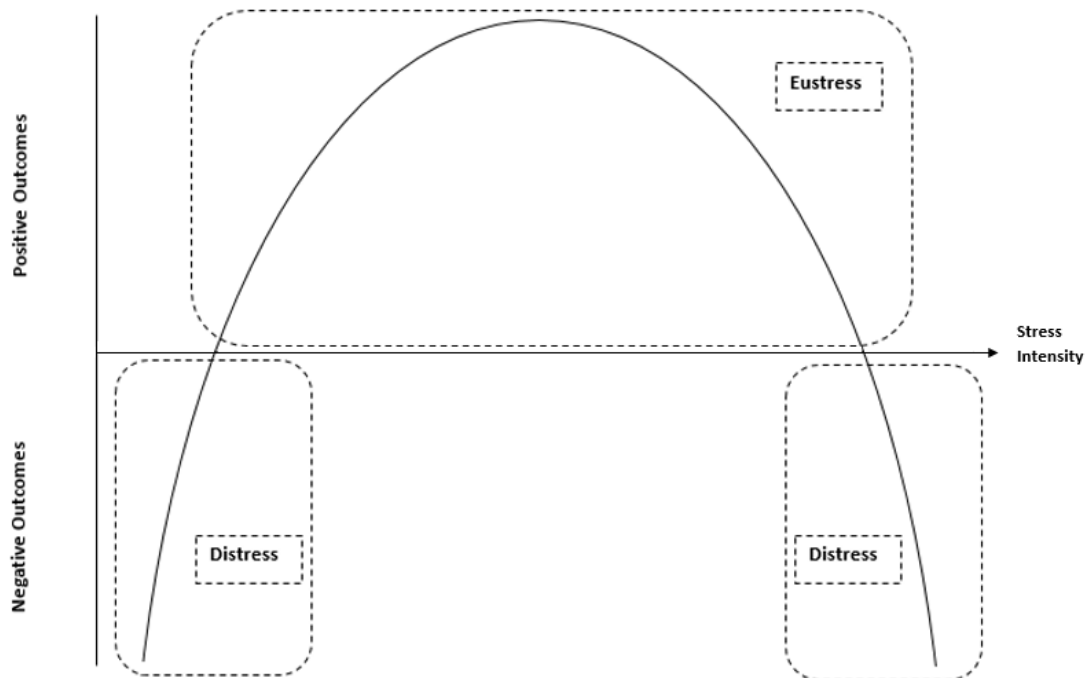
*Figure 7.* Challenge and threat as defined by the Biopsychosocial Model (adapted from Seery, 2013).

Numerous correlational, experimental, and predictive studies have supported the validity of this model (see Blascovich, 2008 for a review). However, this empirical evidence is largely focussed on biological indexes of cardiovascular activity; less investigation has been conducted in domains pertinent to psychology. Given the principal focus on physiological outcomes, the model was rarely cited in the reviewed psychological literature.

#### **3.2.4.5 Unidimensional models of stress**

The Yerkes-Dodson Law sets out that performance is optimised with a medium level of physiological arousal and deteriorates at low and high arousal levels (e.g. Muse et al., 2003). This Law has been translated into the stress literature, setting out the relationship between ‘stress’ and various performance and health outcomes can be described by an inverted-U model, as in Figure 8 (Aldwin & Stokols, 1988; Gibbons, 2012; Gibbons, Dempster, & Moutray, 2009a, 2011; Le Fevre et al., 2003). The related Individual Zone of Optimal Functioning Theory (Hanin, 1995) improves on the simplistic inverted-U model by suggesting that the optimal level of stress intensity varies at the individual level (Frame & Reichin, 2019). Following this reasoning, some researchers have

simplistically classified ‘eustress’ as any experience of stress that leads to optimal performance and ‘distress’ as any experience of stress that deteriorates performance (e.g. Gibbons, 2010, 2012; Gibbons et al., 2008, 2009a, 2011).



*Figure 8.* Visual representation of a unidimensional understanding of stress.

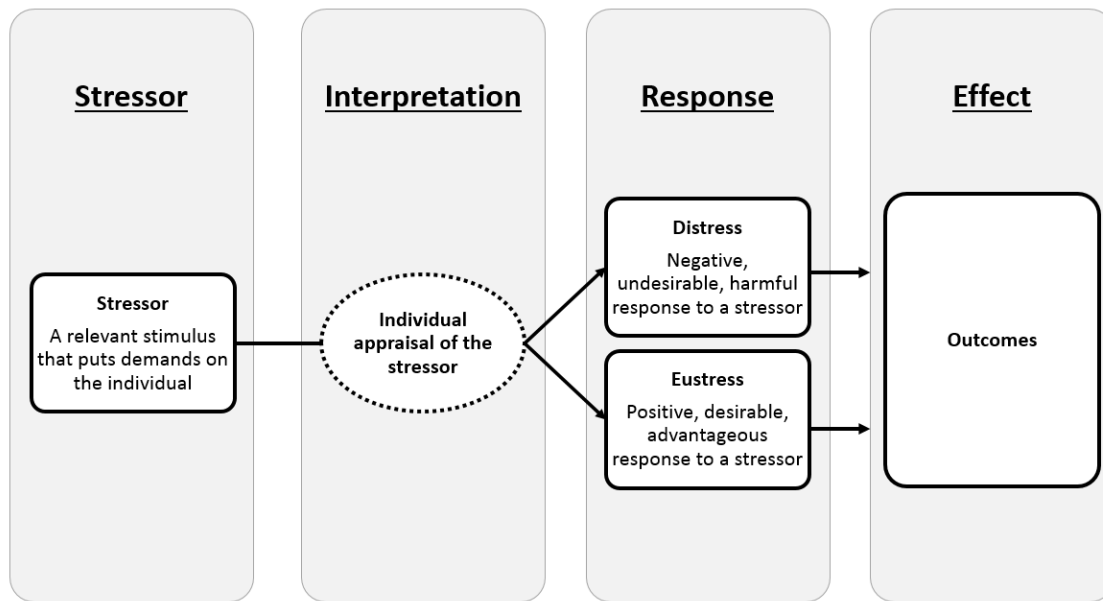
Despite the ubiquitousness and intuitive appeal of the Yerkes-Dodson Law and associated models, large scale reviews of the literature reveal limited empirical evidence supporting the theory (e.g. Muse et al., 2003). Additionally, most models of stress, including the prominent models reviewed above, agree that eustress and distress are distinct constructs rather than aspects of a unidimensional construct. Inverted-U models may have something to add to the reviewed conceptualisations of stress, in that the intensity of a stressor may curvilinearly effect an individual’s appraisal and therefore the stress response. However, to define eustress and distress according to a solely unidimensional model is overly simplistic and circular in logic. The validity and utility of unidimensional models of stress therefore appears limited and such models were not considered when proposing the partial-consensus definition of stress below.

### 3.3 Partial-Consensus Definition of Stress

While all models reviewed above accept the broad distinction between positive and negative stress responses, they differ in their specific conceptualisations. This has led to poor comparison across the literature and little replication of empirical findings (Burton & Hinton, 2010). However, while variations exist between the differing conceptualisations, there is significant overlap and agreement across the models and the majority incorporate four key concepts:

1. A stimulus that puts demands on the individual, known as the stressor;
2. Some sort of individual appraisal of the stressor;
3. A stress response, which can be either positive or negative; and
4. An outcome or effect of the stress response.

As Rice states, “no one [stress] theory has provided a complete picture ... each provides important pieces of information that help round out the picture” (1999, p. 28). The current thesis therefore takes an integrative approach in defining stress, synthesising across Selye’s original work and subsequent contemporary theories to conceive a partial-consensus definition (summarised in Figure 9). This definition focuses only on those key elements of the stress process for which there is agreement across the various theoretical models and is thus necessarily broad. While the word ‘stress’ is often used by lay people to refer to both the process (i.e. Interpretation and Response boxes in Figure 9) and the outcome (i.e. Effect box, Figure 9), psychologically the term ‘stress’ refers only to the former (Egger & Reznik, 2017).



*Figure 9.* A visual description of the partial-consensus definition of stress, conceived by the thesis author from a synthesis of the prevailing stress theories in the literature.

Examining the first key element of the partial-consensus definition, a stressor is defined as a relevant stimulus that places a demand on an individual (J. R. Edwards & Cooper, 1988; Grant et al., 2004; F. Jones & Bright, 2001b; Rice, 1999). Stressors initiate a stress response, which can be positive or negative (Le Fevre et al., 2003; Rice, 1999). A stressor can be physical or psychological and can be “tangible or mentally evoked” (Meir Drexler & Wolf, 2017, p. 286). As per the Transactional Approach, only stimuli relevant to the individual are proposed to initiate a stress response (Lazarus & Folkman, 1984; McGowan et al., 2006; Rice, 1999).

Consistent with the three most prominent stress models reviewed, stressors are considered to have no inherent valence, such that the stress response is subjective and dependent upon the individualised appraisal of the demand. Whilst the debate on stress theories has been “waged by argument rather than by experiment” (J. W. Mason, 1971, p. 323), empirical evidence supports the importance of appraisal in response to stressors (e.g. González-Morales & Neves, 2015; Lazarus, 1993).



In line with prevailing theory, stress appraisals are suggested to depend both on the characteristics of the stressors and of the individual. In reviewing the literature, Le Fevre et al. (2003) suggested that stressors can be identified by a series of key characteristics that influence appraisal including: timing, source, perceived controllability, and perceived desirability. Chronicity and accumulation of stressors have also been suggested to be important factors (Dhabhar, 2018; Frame & Reichin, 2019; Kiang & Buchanan, 2014). Individuals also vary in the personal resources they bring to a situation (e.g. hardiness, locus of control, sense of coherence, as per the Holistic Model), which research suggests directly affect their appraisals and subsequent stress response (Byron et al., 2018; Le Fevre et al., 2003; Nelson & Simmons, 2003). Overall, it is proposed that situational characteristics combine with individual differences to determine how the stressor is appraised (Figure 10; Byron et al., 2018; Le Fevre et al., 2003). The exact nature of the individual and environmental factors influencing this appraisal are outside the scope of the current thesis. Investigating and defining these factors is an obvious prospective for future research (discussed in Section 9.5.1, p. 315); however, such an investigation is only achievable through the use of a valid, reliable measure of the stress response (such as the one developed through the course of this thesis).

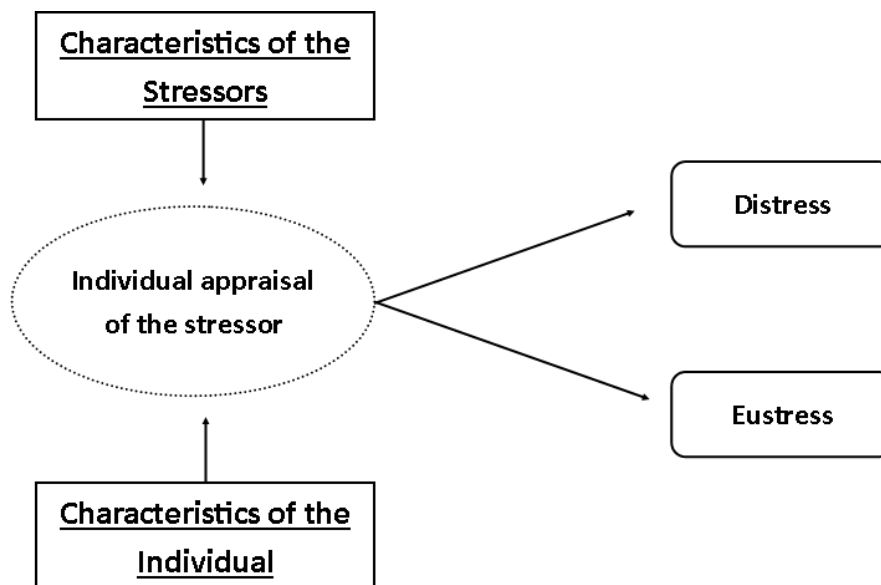


Figure 10. Factors proposed to influence the individualised appraisal of a stressor.

Consistent with prevailing theoretical and empirical evidence, the partial-consensus definition asserts that the stress response can be delineated into both positive and negative aspects. Eustress is defined as a positive, desirable, and advantageous response to a stressor. Distress is defined as a negative, undesirable, and harmful response to a stressor. Eustress and distress are considered to be distinct constructs rather than extremes on a continuum and as such, individuals can simultaneously experience distress and eustress (Jarinto, 2011; Le Fevre et al., 2003; McGowan et al., 2006; O'Sullivan, 2011; Quinones et al., 2016; Simmons & Nelson, 2001). Distress and eustress are proposed to differentially effect key outcomes (e.g. Boswell et al., 2004; Cavanaugh et al., 2000; Kozusznik et al., 2012).

The partial-consensus definition comprehensively incorporates core elements of the reviewed models and provides clear, concise definitions of distress and eustress well-grounded in substantive psychological theory. The model outlined in Figure 9 therefore served as the overall definitional framework for the current thesis, guiding the development of the ADES.

## **CHAPTER 4. A QUALITATIVE EXAMINATION OF THE INDICATORS OF DISTRESS AND EUSTRESS IN ADOLESCENCE**

The partial-consensus definition described in the previous chapter provides clearly articulated, theoretically grounded definitions of distress and eustress. However, as these constructs are not directly observable, the next step in developing the ADES required the identification of quantifiable ‘effect indicators’ to serve as accurate proxies for the underlying latent constructs (DeVellis, 2006, 2012). While the limited literature on this topic has advanced numerous psychological, physiological, and behavioural phenomena as potential indicators of the stress response, the vast majority of the literature focusses exclusively on adults. Attempting to directly apply this research to the creation of a measure of adolescent stress would discount the unique experiences and developmental challenges of young people (e.g. Compas, 1987b). Therefore in Paper 1 adolescents’ unique lived experience of stress was examined, with a qualitative approach used to describe the phenomena that young people identify as salient indicators of distress and eustress. Results from the thematic analysis of the 20 semi-structured interviews provided a vast pool of salient indicators from which the ADES was created.

This chapter presents Paper 1, the first study conducted as part of the current thesis. It begins by providing the relevant theoretical and methodological background for the study, expanding upon that included in the final published paper. Paper 1 was published as a Brief Review in the *International Journal of Stress Management*, necessitating the trimming of numerous participant extracts from the results. The final section of this chapter presents the study manuscript with the unabridged Findings section, illustrating the more detailed and comprehensive analysis.

## **4.1 Theoretical Background: Paper 1**

### **4.1.1 Rationale for Qualitative Approach**

A qualitative approach was used in Paper 1 to investigate adolescents' lived experience of stress. Qualitative research aims to "understand the perspectives/experiences of individuals or groups and the contexts in which these perspectives or experiences are situated" (O'Brien, Harris, Beckman, Reed, & Cook, 2014, p. 1245) and was considered appropriate for use in Paper 1 for a number of reasons, discussed below.

#### **4.1.1.1 *In-depth inquiry***

To the authors' knowledge, no other study has examined the effect indicators of the adolescent stress response. In such understudied areas, a qualitative approach is considered particularly apt as it allows for in-depth inquiry into unexplored areas of research (Frith & Gleeson, 2008; MacDonell, Carcone, Naar-Kind, Gibson-Scipio, & Lam, 2015; Pope & Mays, 2006; Tummala-Narra, Deshpande, & Kaur, 2016).

#### **4.1.1.2 *Giving 'voice'***

In light of the diversity of definitions and approaches in the stress literature, it has been argued that considering the 'discourses' of stress is key to understanding the phenomenon (D. Bartlett, 1998). This 'Discursive Perspective' emphasises the need to take into account individuals' experiences and lay theories of stress. Further, as discussed in Section 2.3.3.1 (p. 65), the thesis as a whole was based on the premise that young people are experts in their own life and that any attempt to measure stress in this group must therefore be grounded in their experience (Braun & Clarke, 2013; Compas et al., 1987; J. Mason & Danby, 2011; Redmond et al., 2016). A qualitative approach gives 'voice' to the adolescents (Braun & Clarke, 2013), allowing their individual reality to

emerge rather than be imposed on them by researchers (D. Bartlett, 1998; C. L. Cooper & Dewe, 2004).

#### **4.1.1.3 Track record**

Qualitative methods are an accepted precursor to scale development in the psychometric literature (F. Jones & Bright, 2001b; Pope & Mays, 2006; Van Teijlingen & Hundley, 2002). It has been suggested that in-depth qualitative interviewing is useful in establishing which issues the scale should address (Van Teijlingen & Hundley, 2002) and is a simple way to investigate which terms will prove comprehensible in a subsequent questionnaire (Pope & Mays, 2006). As an example, Redmond et al. (2016) successfully utilised the perspectives of children (aged 8 – 14 years) to develop a tailored wellbeing measure. Here, focus groups and interviews were used to qualitatively identify issues relevant for young people and to subsequently develop salient wellbeing indicators.

#### **4.1.2 Paper 1 Qualitative Research Paradigm**

Qualitative methodology is underpinned by ontological and epistemological assumptions<sup>8</sup>, which circumscribe what constitutes meaningful knowledge in qualitative research (see Braun & Clarke, 2013 for a comprehensive overview). It is thus considered vital in qualitative research to explicitly clarify these underlying assumptions (Braun & Clarke, 2006; O'Brien et al., 2014). As is common in qualitative research, Paper 1 took the ontological stance of critical realism, which assumes a pre-social reality exists, but that it is only partially knowable. Additionally, the research was experiential, being “driven by the desire to know people’s own perspectives and meanings” (Braun & Clarke, 2013, p. 21). Epistemologically, Paper 1 took a contextualist perspective, assuming that ‘truth’ can

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<sup>8</sup> Ontology refers to assumptions about the nature of being and reality, while epistemology relates to the nature of knowledge.

be accessed through language. Language is therefore treated as a straightforward window to a person's inner perspective, such that participants own interpretation is accepted and prioritised. Relatedly, the research is empathic, honouring the experiences of participants (Braun & Clarke, 2006, 2013).

#### **4.2 Methodology: Paper 1**

In Paper 1, the qualitative interview data were analysed using Thematic Analysis (TA), defined as "a method for identifying themes and patterns of meaning across a dataset in relation to a research question" (Braun & Clarke, 2013, p. 175). TA is considered to be suitable within many different qualitative frameworks and is suggested to be a particularly apt approach for research questions pertaining to participants' experiences and for interactive data collection methods such as interviews (Braun & Clarke, 2013). While TA is a flexible methodology, it provides researchers with a systematic framework for conducting qualitative analysis and fits with the realist, contextualist, and experiential approach described above (Braun & Clarke, 2006, 2013; Glozah, 2015).

TA was undertaken following the practical recommendations of Braun and Clarke (2006, 2013), which outline six stages of analysis (summarised in Table 7). Although these steps are presented as discrete and sequential, TA allows for more fluidity, moving backwards and forwards between stages throughout the analysis process (Ayres, 2008; Braun & Clarke, 2006). For Paper 1, analysis took place alongside data collection so there was no clear separation of these stages (Braun & Clarke, 2013; Pope, Ziebland, & Mays, 2000). In light of this integrative approach, the choice was made to combine the results

and discussion when producing the final paper, followed by a succinct conclusion<sup>9</sup>. The specific details of the use of TA are discussed more fully in the published paper (Section 4.3.3, pp 114 - 119).

Table 7

*The Six Stages of Thematic Analysis (adapted from Braun & Clarke, 2006, 2013)*

Phase	Description of the process
Familiarisation with data	Transcribing data as necessary. Reading and re-reading the data, noting down initial ideas.
Generating initial codes	Coding interesting features of the data in a systematic fashion across the entire data set. Collating data relevant to each code.
Searching for themes	Collating codes into potential themes. Gathering all data relevant to each potential theme.
Reviewing themes	Checking themes in relation to the coded extracts and the entire data set. Generating a thematic 'map' of the analysis.
Defining and naming themes	Generating clear definitions and names for each theme. Ongoing analysis to refine the specifics of each theme and the overall analysis.
Producing the report	Relating analysis back to the research question and the literature. Selection of vivid, compelling extract examples and final analysis of these extracts. Producing a scholarly report of the analysis.

*Note.* These stages are described slightly differently between these two references. In Braun and Clarke (2013) the first stage 'Familiarisation with data' is separated into 'Transcription' and 'Familiarisation'. However, the content across the two versions remains constant.

<sup>9</sup> When Paper 1 was published, journal editors renamed the sections 'Findings' and 'Conclusion' as, respectively, 'Results' and 'Discussion' to be in line with quantitative notation.

#### **4.2.1 Ensuring Methodological Rigour**

Rigour in qualitative research is ensured by “systematic and self-conscious research design, data collection, interpretation, and communication” (Mays & Pope, 1995, p. 110). Overall, Paper 1’s methodology adhered to Braun and Clarke’s (2006, 2013) criteria for good quality qualitative research and was presented according to the accepted Standards for Reporting Qualitative Research (O'Brien et al., 2014). Further, throughout the entire project there was ongoing consultation, negotiation, and agreement amongst the supervisory team as to the adequacy of the methodology. A thorough audit trail was kept, tracing the project from inception through to the final submitted paper. The research also took several specific additional steps to ensure the methodology was thoroughly rigorous, described below,

##### **4.2.1.1 Reflexivity**

In qualitative methodologies, researchers must maintain a self-awareness of how their subjectivity impacts on the interactions with participants and the interpretation and analysis of data (Grbich, 1999; O'Brien et al., 2014). Personally, I (the author<sup>10</sup>) came at the research from two distinct positions that may have affected my subjectivity. Firstly, my working background is in the educational system, where I traditionally acted in an authoritarian ‘teacher’ role. Secondly, I have strong personal and professional ties to Pembroke School, the private school recruitment site, meaning I had pre-existing ideas about the school and established relationships with students and teachers, including family and friends. This personal background, along with that of the supervisory team may have impacted on our subjectivity when conducting the interviews and interpreting the resultant data. In light of this, steps were taken to ensure self-awareness and

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<sup>10</sup> Note that this paragraph is written in first person to emphasise the personal subjectivity and self-reflection of the author.



transparency. Firstly, I kept a journal of developing thoughts throughout analysis, identifying perspective and personal meaning (Grbich, 1999). Further, the supervisory team engaged in regular mindful discussions around participant interactions, coding, emerging themes, and presenting the results.

#### **4.2.1.2 Analytic rigour**

##### **4.2.1.2.1 Transcription**

A thorough orthographic transcript was produced for each interview by the author. Interviews were listened through once at full speed, then slowed to 50% to transcribe; transcriptions were then verified by listening to the recording an additional time and making required corrections. A consistent transcription notation system was used, which took into account all utterances, including actual words, non-semantic sounds, and paralinguistic features of talk (e.g. pauses, laughing etc.), as well as sentence structure, mistaken words, and punctuation. All transcripts were completed within one week, to ensure memory of the interviews was clear and to minimise transcription errors.

Another key step was anonymising the transcripts, to ensure the privacy and confidentiality of participants. Given the nature of interviewing, transcripts contained hints to the person's identity. To safeguard against this, all potentially identifying information was either excluded or replaced with a non-attributable noun (e.g. a family member's name could be replaced with 'Sibling'). This process was thoroughly tracked and recorded in the audit trail.

##### **4.2.1.2.2 Coding**

To ensure coding was of high quality from the outset, the author and primary supervisor initially read and coded one transcript separately before coming together to negotiate and agree on a coding structure. This structure was then used to individually

re-code the same transcript. Coming together again, there was high degree of concordance between the two coders for the analysed transcript (i.e. inter-rater agreement).

Subsequent coding followed procedures outlined by Braun and Clarke (2006, 2013). First, any feature of interest was coded across the entire data set. After this complete coding, the indicator codes were reviewed to ensure they were concise and during this process, several overlapping codes were collapsed into broader codes. Specific attention was given to contradictory cases, so as not to ignore or minimise important inconsistencies. Finally, all relevant extracts were collated within the codes and extensive notes were written about each code's central organising concept.

#### **4.2.1.3 Member checking**

Member checking is a process of verifying analysis with the study participants to ensure a fit between the analytic interpretation and participant understanding and avoid misrepresenting their views. Traditionally, this involves sending a draft version of the analysis to participants for feedback (Braun & Clarke, 2013). However, this method was considered inappropriate and infeasible for the adolescent participants. As such, member checking was completed via a second interview (Aronowitz, 2005).

80% of the original participants were available for a second interview, which took place approximately three months after the main data collection. Participants were presented with a description of the analysis appropriate for their age along with the proposed thematic map, which visually presented the overall conceptualisation of the themes (Braun & Clarke, 2006). The thematic map was presented in an entertaining manner that encouraged enthusiasm and engagement with the process (see Figure 11).

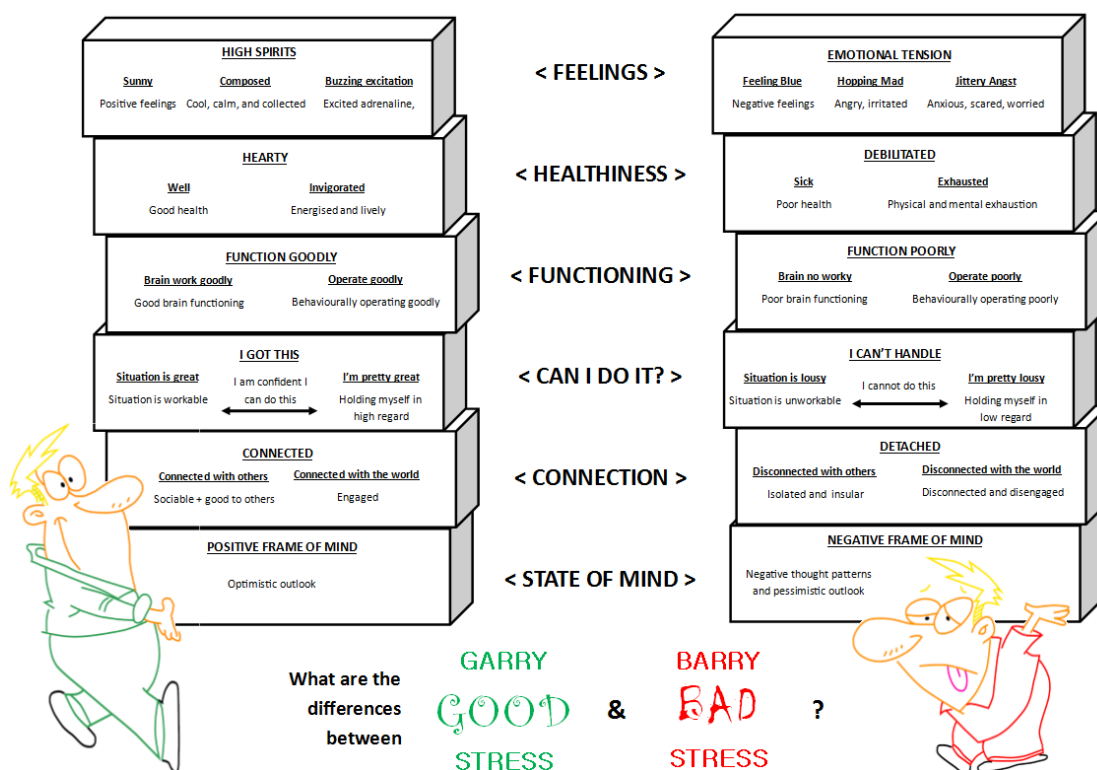


Figure 11. The thematic map presented to participants at member checking for Paper 1 results.

Member checking served two purposes. Firstly, participants were asked to comment on the trustworthiness and authenticity of this analysis. Secondly, discussion centred on the reviewing and refinement of themes. Participants were asked to review several codes that the supervisory team disagreed upon and place them in the theme ('box') they considered most suitable. Whilst there was not unanimous agreement on where the codes should fit, the participants' reflexive elaboration helped to clarify the themes and encourage a deeper, more involved understanding.

### **4.3 Paper 1 - How do young people experience stress? A qualitative examination of the indicators of distress and eustress in adolescence**

Paper 1 was published as a Brief Report. The page length restrictions of the Brief Review format necessitated trimming participant extracts of the Findings section. The paper is presented here with the unabridged Findings section (pages 119 - 134), in manuscript format, with the same typeset as the rest of the thesis. The published journal format appears as Appendix A. Content published as online supplemental material for the article appears in Appendix B.

#### **Statement of Authorship**

*Title of Paper:* How do young people experience stress? A qualitative examination of the indicators of distress and eustress in adolescence

*Publication status:* Published

*Publication details:* Branson, V., Turnbull, D., Dry, M. J., & Palmer, E. (2019). How do young people experience stress? A qualitative examination of the indicators of distress and eustress in adolescence. *International Journal of Stress Management*, 26, 321-329. doi: 10.1037/str0000102

#### **Principal Author**

*Name of Principal Author (Candidate):* Victoria Branson

*Contribution to the Paper:* Developed rationale for the study and devised aims. Planned and carried out data collection and performed data analysis. Drafted, wrote, and submitted article, then revised and responded to reviewer comments. Acted as corresponding author.

*Overall Percentage (%):* 80%

*Certification:* This paper reports on original research I conducted during the period of my Higher Degree by Research candidature and is not subject to any obligations or contractual agreements with a third party that would constrain its inclusion in this thesis. I am the primary author of this paper.

*Signature:*

*Date:* 26 November 2019

### **Co-authors**

By signing the Statement of Authorship, each author certifies that:

- i. The candidate's stated contribution to the publication is accurate (as detailed above);
- ii. Permission is granted for the candidate to include the publication in the thesis; and
- iii. The sum of all co-author contributions is equal to 100% less the candidate's stated contribution.

*Name of Co-Author:* Professor Deborah Turnbull

*Contribution to the Paper:* Input regarding study design and sampling. Assisted in analysis of data. Supervised the data collection and preparation of manuscript. Provided editorial and structural feedback on paper.

*Signature:*

*Date:* 26 November 2019

*Name of Co-Author:* Dr. Matthew J Dry

*Contribution to the Paper:* Supervised development of the work and input regarding analysis of data. Provided guidance on the preparation of manuscript and editorial and structural feedback on the paper.

*Signature:*

*Date:* 26 November 2019

*Name of Co-Author:* Associate Professor Edward Palmer

*Contribution to the Paper:* Supervised development of the work and input regarding analysis of data. Provided guidance on the preparation of manuscript and editorial and structural feedback on the paper.

*Signature:*

*Date:* 26 November 2019

#### **4.3.1 Abstract**

Extant literature describes stress as an unavoidable occurrence that can be bifurcated into both negative and positive aspects, known as distress and eustress. Despite this theoretical conceptualisation, there are no measures of adolescent stress encompassing both aspects of the construct. In pursuing the creation of such a measure the current study explored young peoples' experience of stress, describing the phenomena adolescents identify as salient indicators of both distress and eustress. Semi-structured qualitative interviews were conducted with 20 adolescents; thematic analysis of the transcripts focussed on those indicators useful for discriminating between distress and eustress. Six key dimensions were proposed, along which eustress and distress were differentiated in adolescents: State of Mind, Function, Perceived Efficacy, Affect, Constitution, and Connection. While many of these identified phenomena were comparable to those proposed by the adult-focussed literature, the participants demonstrated a range of distinctive perspectives. Unlike adults, the adolescents considered personal connections and self-regard as salient indicators of the stress response, while meaningfulness was not considered a pertinent phenomenon. These idiosyncrasies emphasise the inappropriateness of directly translating adult-focussed literature to the adolescent context and robustly reiterate the need for a measure of stress that reflects and respects young peoples' unique experiences.

#### **4.3.2 Introduction**

Adolescence is a time of transformation, with young people facing physical, psychological, academic, and social changes (e.g. Moksnes, Løhre, et al., 2014). Considering these pressures, many young people experience their adolescence as a 'stressful' period (Venning et al., 2013). While lay understandings tend to conceptualise

stress as dysfunctional and undesirable (e.g. F. Jones & Bright, 2001a), current theory suggests stress is not intrinsically maladaptive.

Prominent contemporary stress models, such as the Transactional Approach (Lazarus & Folkman, 1984) and the Holistic Stress Model (Nelson & Simmons, 2003), emphasise that stress can be both negative and positive. Given the variation between such stress models, the current paper takes an integrative approach, synthesising across theoretical conceptualisations to reach a partial-consensus definition. Broadly, stress is considered as an individuals' response to a demanding stimulus, or 'stressor'. Stressors have no inherent valence, meaning an individual's experience of stress depends on their appraisal of that demand. The resultant response can be differentiated into distress, the negative, undesirable, and harmful response to a stressor, and eustress, the positive, desirable, and advantageous response to a stressor. These two responses are considered distinct constructs, rather than extremes on a continuum. Whilst discussion of stress theories has been "waged by argument rather than by experiment" (J. W. Mason, 1971, p. 323), empirical evidences supports the importance of appraisal in the response to stressors (González-Morales & Neves, 2015; Lazarus, 1993).

Despite this prominent theoretical conceptualisation, there are no measures of adolescent stress that holistically incorporate both distress and eustress. Within the literature, three existing measures capture the distinction between positive and negative stress: the Self-Report Stress Response Questionnaire (Hargrove et al., 2014), the Valencia Eustress-Distress Appraisal Scale (Rodríguez et al., 2013), and the Stress Professionnel Positif et Négatif (De Keyser & Hansez, 1996). However, each of these measures focuses exclusively on the adult work context. The current paper represents the early stages of a larger project that will address this disjunct between theory and



measurement by developing a novel measure of the adolescent stress response encompassing both distress and eustress.

As with many psychological variables, distress and eustress are theoretical constructs that are not directly observable. To operationalise such 'latent' variables, scales are constructed from quantifiable 'effect indicators' that serve as observable proxies for the underlying constructs (DeVellis, 2006, 2012). Therefore, developing a measure of the adolescent stress response requires identifying phenomena that can serve as effective, compelling, and well-founded indicators for distress and eustress in this population.

There is no definitive inventory of effect indicators for the stress response for either adults or adolescents. However, the limited extant literature on this topic has advanced numerous psychological, physiological, and behavioural phenomena as potential indicators for the stress response, summarised in Table 8. A prominent example is Nelson and Simmons' (2003) treatment in their Holistic Stress Model. This model emphasises that eustress and distress are distinguishable by affective state, with distress associated with negative psychological states and eustress with positive psychological states. As instances of these states, Nelson and Simmons proposed anger, alienation, frustration, negative affect, burnout, and anxiety as indicators of distress, and hope, meaningfulness, manageability, and positive affect as indicative of eustress. Other commonly cited examples contrast disturbed with healthy bodily states (e.g. McGowan et al., 2006; Sudefeld, 1997) and dysfunctional with facilitative behaviours (e.g. B. D. Edwards et al., 2014; Rice, 1999) as indicative of distress and eustress respectively.

However, the existing research is limited by its exclusive focus on adults, meaning the indicators proposed are inexorably entrenched within this context. Attempting to directly apply this adult-focussed research to the adolescent context discounts the

unique experiences of young people. As Compas (1987b) outlines: “adult professionals and researchers may not accurately reflect the experience of children and adolescents, as they are hindered by differences in age, the limits of existing knowledge in the field, theoretical biases...” (p. 279).

The fundamental premise of the current research is that adolescents are the experts in their own lives. Therefore, any attempt to understand distress and eustress in this group must be grounded in their experience (Braun & Clarke, 2013; J. Mason & Danby, 2011). Taking a qualitative approach, the overarching purpose of this paper is to ‘give voice’ to adolescents, placing their ideas and accounts at the centre (Braun & Clarke, 2013). The study aimed to examine adolescents’ experience of stress, describing the phenomena young people identify as salient indicators of distress and eustress.

Table 8

*A Summary of the Phenomena Proposed in the Extant Literature as Effect Indicators of the Stress Response*

	Physiological Indicators	Behavioural Indicators	Psychological Indicators	
			Cognitive	Affective
Distress	<ul style="list-style-type: none"> <li>• Accelerated heart rate</li> <li>• Backaches</li> <li>• Disturbed body states/ill health</li> <li>• Exhaustion/fatigue</li> <li>• Headaches</li> <li>• Loss of appetite</li> <li>• Muscular tension</li> <li>• Physical weakness</li> <li>• Rapid/shallow breaths</li> </ul>	<ul style="list-style-type: none"> <li>• Absenteeism</li> <li>• Accident proneness</li> <li>• Aggression/hostile</li> <li>• Alcohol/substance abuse</li> <li>• Alienation/withdrawal</li> <li>• Bullying and violence</li> <li>• Changes in sleep patterns</li> <li>• Dysfunctional/damaging/destructive</li> <li>• Emotional outbursts</li> <li>• Hinders achievement/performance</li> <li>• Lower productivity</li> <li>• Neglect of responsibilities</li> <li>• Restless</li> </ul>	<ul style="list-style-type: none"> <li>• Expecting the worst</li> <li>• Hopeless</li> <li>• Loss of motivation</li> <li>• Loss of recall</li> <li>• Negative thoughts</li> <li>• Racing thoughts</li> <li>• Reduced capacity for decision making</li> <li>• Unfocussed</li> </ul>	<ul style="list-style-type: none"> <li>• Anger</li> <li>• Anxiety</li> <li>• Apprehension/dread</li> <li>• Doubt</li> <li>• Fear</li> <li>• Feeling out of control</li> <li>• Frustration/Irritability</li> <li>• Guilt/shame</li> <li>• Irritability</li> <li>• Low self-confidence</li> <li>• Negative Affect/Sadness</li> <li>• Self-pity</li> <li>• Worry</li> </ul>
Eustress	<ul style="list-style-type: none"> <li>• Butterflies in the stomach</li> <li>• Energised/stimulated</li> <li>• Healthy bodily states/good health</li> <li>• Vigour</li> </ul>	<ul style="list-style-type: none"> <li>• Constructive and advantageous</li> <li>• Enthusiastic engagement with the task</li> <li>• Facilitate achievement/performance</li> <li>• Flourishing</li> </ul>	<ul style="list-style-type: none"> <li>• Alert</li> <li>• Flow– in the zone</li> <li>• Focussed</li> <li>• Hope</li> <li>• Manageability</li> <li>• Meaningfulness</li> <li>• Motivation</li> </ul>	<ul style="list-style-type: none"> <li>• Enjoyment</li> <li>• Excitement/exhilarated</li> <li>• Fulfilment</li> <li>• Gratitude</li> <li>• Pleasure</li> <li>• Positive affect</li> <li>• Satisfaction</li> <li>• Thrilling</li> </ul>

*Note.* See Appendix B for relevant citations [submitted as online supplemental material in the published paper]

### **4.3.3 Method**

#### **4.3.3.1 Methodological approach**

Taking a qualitative approach allows for in-depth inquiry into this unexamined area of research and is an accepted precursor to scale development (Pope & Mays, 2006). This research is experiential and contextualist, assuming truth can be accessed through language. Language was thus treated as a straightforward window to a person's inner perspective, such that participants' own interpretation were accepted and prioritised (Braun & Clarke, 2006, 2013).

#### **4.3.3.2 Participants**

##### **4.3.3.2.1 Context**

Adolescence is defined in the South Australian Mental Health Survey as “the developmental period between the ages of 12 and 20 years” (Venning et al., 2013, p. 31). To fulfil ethical requirements, participants were required to be aged over 13 years and be fluent in English. Additionally, to capture a cross-section of educational institutions, participants were recruited from an independent private school, public government school, and tertiary university.

##### **4.3.3.2.2 Sampling**

To ensure participants could provide ‘information rich’ data, purposive maximum variation sampling was conducted (Braun & Clarke, 2013; Grbich, 1999). Participants were chosen based on a selection matrix of age, gender, academic achievement, and educational institution (see Figure 12).

Institute	University						Public Government						Independent Private					
Age	<del>13-14</del>		<del>15-17</del>		18-20		13-14		15-17		<del>18-20</del>		13-14		15-17		<del>18-20</del>	
Gender	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Achievement	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L
1 2 3 4 5 6 7 8 9 10 11 12												13 14 15 16 17 18 19 20						

*Figure 12.* Selection matrix used for maximum variation sampling. Crossed-out cells indicate impossible combinations. H: Higher academic achiever, L: Lower academic achiever.

This transferable sample represents a wide range of sociodemographic factors that may affect the variability of the adolescent stress experience. Saturation was reached after 12 interviews, however, all interviews were completed so as to procure the full range of pertinent features. The final sample consisted of 20 participants, see Table 9.

Table 9

*Characteristics of Participants*

Participant number	Gender	Age <sup>a</sup>	Institution
P1	F	19	University
P2	M	18	University
P3	F	20	University
P4	M	18	University
P5	F	13	Private
P6	M	15	Private
P7	F	15	Private
P8	M	13	Private
P9	M	13	Private
P10	F	16	Private
P11	M	15	Private
P12	M	16	Public
P13	F	16	Public
P14	M	16	Public
P15	F	16	Public
P16	F	13	Private
P17	M	14	Public
P18	M	14	Public
P19	F	13	Public
P20	F	13	Public

<sup>a</sup>Age in years at the time of Interview 1 (May-August 2016)

*Note.* As an ethical requirement, the authors did not have access to participants' academic achievement. Educational leaders at the respective institutions were made aware of the sampling matrix and selected suitable participants from an initial pool of volunteers.

#### **4.3.3.3 Data collection**

Semi-structured individual interviews of approximately 30-minute duration (range 18:31-38:42) were conducted by the lead author within each institution. Interviews followed a broad guide of core topics (see Appendix C)<sup>11</sup>, but were open and flexible to interviewee responses. Each interview began with the interviewer defining distress and eustress<sup>12</sup> and discussing the face validity of this model with the participant. Then, participants were asked to discuss distress and eustress in turn. Participants' described a specific situation where they experienced the relevant response and recounted the psychological, physiological, and behavioural symptoms they experienced, using their chosen situation as a starting point to discuss the stress response more generally. Additionally, to enhance participant engagement and authenticity, time was taken before each interview to familiarise the participants with the interviewer and the expectations of a qualitative interview, building trust and rapport. Interview content was consistent across all interviews, however the language varied to reflect the participant's age. Three pilot interviews were conducted to ensure the developmental appropriateness and efficacy of the interview guide; no data were collected nor analysed from these preliminary interviews.

Ethical considerations emphasised anonymity, informed consent (participant and, where necessary, parental), and safeguarding of participants' emotional wellbeing. While privacy was imperative, participants were advised that a mandatory notification protocol was in place. This study was approved by the University of Adelaide School of

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<sup>11</sup> *Not submitted as part of published paper, but included here for clarity*

<sup>12</sup> With consultation from the educational institutions, the choice was made to refer to distress as 'bad stress' and eustress as 'good stress' to ensure understanding. The use of these terms is reflected in the extracts presented in the Findings section

Psychology: Human Research Ethics Subcommittee (Code Number: 16/17) and the Department of Education and Child Development (Reference CS/16/00068-1.4).

#### **4.3.3.4 Data analysis**

Interviews were audio-recorded and rigorous orthographic transcripts produced. Thematic analysis of these transcripts was undertaken, adhering to Braun and Clarke's (2006, 2013) criteria for good quality qualitative research. To ensure analysis was flexible and robust, data were managed using NVivo qualitative data analysis software (QSR International, 2014).

After familiarisation with the data, complete coding was conducted iteratively. Data were first coded into *a priori*, theoretically-driven grandparent codes distinguishing between participants' description of distress and eustress. Within these larger groupings, indicator codes were data-driven. To ensure coding was of high quality from the outset, the initial stages were conducted collaboratively between the first and second author. The authors first coded a subset of the data separately, then came together to negotiate and agree on a coding structure. Using this structure to re-code the same data, the authors found high inter-rater agreement. The first author then independently rated across the entire data set using this coding structure, ultimately consisting of 182 effect indicator codes.

Patterns were then identified across the data set, combining codes to form overarching themes. When considering which patterns were important for the research aim, elements were chiefly considered for meaningfulness over frequency. Themes were derived inductively, being strongly linked to the data and the participants' sense-making rather than being organised around an explicit theoretical framework.

Member checking was used to review and refine themes and ensure a fit between the analytic interpretation and participants' understandings. During this second



interview, the lead author presented an age-appropriate ‘work-in-progress’ thematic map to each of the 16 available participants<sup>13</sup>. Overall, the analysis was unanimously viewed as trustworthy and authentic by participants, helping to establish the credibility and quality of the current findings.

#### **4.3.4 Findings**

As discussed earlier, the current study conceptualises distress and eustress as related, but separate constructs. While participants identified several phenomena as symptomatic of both stress responses (e.g. increased heart rate), the principal focus of the following analysis is on those indicators discriminating between distress and eustress. Six overarching themes were derived inductively, with each theme representing a key dimension along which eustress and distress can be differentiated (Table 10). Analysis sought to explore and make sense of how the participants understood and experienced stress, rather than to develop a catalogue of stress indicators. As such, results should not be interpreted as an exhaustive inventory of all possible indicators of the adolescent stress response, but as a description of those indicators considered salient to the adolescents themselves.

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<sup>13</sup> 4 participants were unable to attend the follow-up member checking interview.

Table 10

*Summary of Themes*

<b>Overarching Theme (<i>n</i>)</b>		
	Distress Subtheme	Eustress Subtheme
<b>1. State of Mind (14)</b>		
	Negative state of mind	Positive state of mind
<b>2. Function (20)</b>		
	Adverse cognitive functioning	Beneficial cognitive functioning
	-	Motivation
	Adverse behavioural operation	Beneficial behavioural operation
<b>3. Perceived Efficacy (20)</b>		
	Untenable situation	Workable situation
	Low self-regard	High self-regard
<b>4. Affect (20)</b>		
	Sadness	Happiness
	Infuriated	Composed
	Angst	Excitation
<b>5. Constitution (18)</b>		
	Debilitated	Hearty
<b>6. Connection (20)</b>		
	Disconnected from environment	Connected with environment
	Disconnected from people	Connected with people

*Note.* *n* refers to the number of participants mentioning this theme/subtheme at least once

The use of numbers in qualitative research is controversial (Braun & Clarke, 2013). Taking a middle-ground approach, the current analysis uses quantifying language to discuss the prevalence of ideas. In the following discussion, 'certain/infrequently' refers to one to three participants, 'some/occasionally' to four to six participants,

‘commonly’ to seven to 12 participants, ‘frequently’ to 13-16 participants, and ‘majority’ and ‘extensively’ to 17-20 participants.

#### **4.3.4.1 State of mind**

This theme captures the participants’ state of mind in response to a stressor, with their mindset differing during each stress response. Participants frequently reported a negative state of mind as symptomatic of distress:

*I start moping around so like if I’ve just done the exam and I’ll automatically think ‘Oh yeah, nah, I’ve ((expletive, read as: botched)) it’ and then I start thinking- ... just the way I’m thinking I’ll just like be pretty down (P11)*

Contrastingly, eustress was constructed as “a good head zone to be in” (P1).

Participants occasionally described having a negative outlook during distress, focusing exclusively on negatives:

*I always think of the worst thing. If I get bad stress I always think of like the worst thing that can happen (P10)*

More extremely, some participants described catastrophising, viewing the situation as subjectively worse than objective reality. Inversely, eustress was commonly associated with a “more of a positive outlook” (P15), with participants solely focusing on the positives.

Participants also frequently described negative thoughts to be indicative of distress. Certain participants outlined that these thoughts can be automatic and snowball:

*I’d start off with one sort’ve negative thought and then I come off with all these other ones ... let’s say umm yeah like my friend doesn’t say hi to me*

*coming off of that I'd be like 'oh she hates me, she doesn't want to be my friend any more' ... and then like I'd start coming up with all these things I might've done when I hadn't done any of them or being like 'Oh now everyone in school is going to hate me and she's going to turn everyone against me ' (P7)*

Commonly, participants' ruminate on these thoughts, becoming preoccupied so that

*"you can't literally do anything else because it just feels like- it just takes over" (P4).*

Similarly, participants occasionally experienced 'overthinking', described as *"the thought is constantly going through my head over, and over, and over again" (P20)*. While the majority of participants did not mention ruminating during eustress, one participant described overthinking during both stress responses.

These results only partially resonate with the adult-focussed literature. Although a negative state of mind has been suggested as a potential indicator of distress (e.g. Hughes et al., 2011), no research was identified that proposed a positive state of mind as indicative of eustress. However, the literature does argue that dispositional optimism promotes eustress by encouraging positive appraisals of stressors (e.g. Nelson & Simmons, 2003). It is thus consistent for eustress to be associated with a positive state of mind.

#### **4.3.4.2 Function**

This theme captures the cognitive and behavioural functioning of the participant in response to pressure. During distress participants frequently characterised their functioning as detrimental, while the majority of participants associated eustress with advantageous functioning:

*...but all the things, not thinking logically, they're all the symptoms of bad stress umm and they just weren't there with good stress ... Like bad stress is working against you, good stress is kinda working with you (P2)*

#### 4.3.4.2.1 Adverse vs. beneficial cognitive functioning

The key cognitive difficulty of distress was a “buzzing and whirring [mind]” (P1), characterised by racing and fragmented thoughts. This was constructed as an intensely negative experience:

*You know you feel really ((expletive, read as: bad)) ... your brain just goes a hundred miles an hour to try and figure stuff out ... it's not really a good impact (P15)*

Some participants described similar raced thoughts during eustress; however, this was not a necessarily negative experience, being described as ‘active’ as opposed to ‘out of control’. Distress was also occasionally described to be characterised by incoherent, confused thinking, an inability to focus, and illogical thought patterns:

*... when I experience stress I feel like to me the whole experience is just like fuzzy, so like my head is just fuzzy and I can't concentrate on what I'm doing. (P1)*

Contrastingly, the key cognitive benefit of eustress was a heightened state of focus:

*I act really focused when I'm good stress cos like I kinda like it's all I'm thinking about ... it's like something that I want to do so and I just like get really focussed on it (P7)*

More intensely, participants commonly described a state of Flow (Csikszentmihalyi, 1990), characterised as complete concentrated engrossment in the task so that “you

*might forget about things like as much as you would think like you're hungry and stuff like you're stressed so you're working on something else, you're not thinking about those things as much" (P13).* Although this was constructed as a beneficial state, one participant mentioned that it could negatively translate to irritable reactions when interrupted. Another commonly described cognitive benefit of eustress was increased methodological thinking, where participants' thinking is *"more serious and more sensible and like really pragmatic" (P1).* Certain participants also described increases in receptivity to feedback, mental alertness, thinking clearly, and curiosity. These results echo the adult-focussed literature, which likewise contrasts adverse with beneficial cognitive functioning (B. D. Edwards et al., 2014; Snodgrass et al., 2011).

#### 4.3.4.2.2 Motivation

Supporting the adult-focussed literature (B. D. Edwards et al., 2014; Hargrove et al., 2011), motivation was a key indicator of eustress, with participants commonly describing that *"good stress can like- it can motivate you, it can give you like a meaning to like do something" (P10).* Furthermore, participants reported feeling 'driven', so that being under pressure leads to a sense of being compelled to act:

*I feel egged on, I feel I-I can feel like the pressure (bearing down) and I'm like ready to accept it ... I just wanna face it head on and like I wanna show what I can do (P14)*

Incongruently with adult-focussed research (Rice, 1999), no participants reported feeling a lack of motivation during distress. However, when reflexively elaborating during member checking, participants speculated that this reflects an omission in reporting, rather than a meaningful difference.

#### 4.3.4.2.3 Adverse vs beneficial behavioural operation

During distress, participants commonly outlined feeling literally unable to function:

*Just feeling like useless in that situation cos I couldn't actually do anything  
... I wanted to do it but I just couldn't (P2)*

Although these accounts focussed on belief, not reality, certain participants did outline tangible examples of inadequate operation, such as confused behaviour and increased mistakes. Contrastingly, during eustress, participants described improved operation:

*I noticed that lots of the boys changed the bad stress and made it good stress so it-it made them like study har- like better. (P1)*

Specific instances of advantageous operation included increased capacity for leadership, organisation, and proactive behaviour. In addition, participants described approaching tasks with increased effort during eustress, sustaining this exertion with determination and perseverance:

*I like push myself a lot harder like I'll don't give up as easy ... like I you know would run until I vomit in netball and you know that like I just like I don't stop ... I guess it's the same with school work as well though like I don't give up and I just keep like even if I find something really hard I like keep at it until I done it (P7)*

Contrastingly, during distress certain participants described being less able to sustain their effort and so “completely give up” (P10).

These results broadly support the adult-focussed literature, which associates distress with dysfunctional behaviour and eustress with facilitative behaviour (e.g. B. D. Edwards et al., 2014). However, unlike extant research, the current participants did not

discuss any socially undesirable behaviours, such as absenteeism or alcohol/substance abuse (Rice, 1999). This could either suggest that these behaviours are absent in adolescents or, more probably, that responses were mitigated by social desirability factors (Hewitt, 2007).

#### **4.3.4.3 Perceived efficacy**

This theme captures a multitude of phenomena related to the individual's circumstantial belief that they can perform the actions necessary for producing pertinent outcomes. Specifically, all participants described perceiving both themselves and their situation differently dependent on their stress response, feeling inadequate during distress and capable during eustress:

*Good stress is more kinda just makes me feel ... like 'you've got it in the bag, like its fine, you just have to do it, that's all' whereas like yeah bad stress more kinda just make me feel like 'you can't do it, just give up now, you've got to much, it's never gonna get done, just leave it' (P7)*

##### **4.3.4.3.1 Situation is untenable vs. workable**

During distress, all participants described perceiving their situation as untenable. Participants described feeling overburdened and overwhelmed by their situation, such that you're *"never gonna be like free of everything"* (P7). Furthermore, some participants felt that everything becomes *"harder for you"* (P7) during distress. In addition, certain participants described judging that the outcomes of the situation did not justify their input: *"the risk and the effort I had to put in just didn't seem enough to me"* (P6); and that their actions were futile: *"I felt like I couldn't help myself no matter how much I like tried ... do yeah, I felt very trapped (P1)"*. Finally participants commonly perceived their situation as disagreeable, so that they are reluctant and *"want to be out of the situation"* (P18).



Conversely, during eustress, participants' situation was exclusively considered as more workable. Unlike distress, some participants outlined feeling free of onus and *"on top of everything"* (P3). Moreover, some participants felt pressure made situations 'easier':

*...having to work under pressure like a big pressure or stress but it like leads you to do good things, like it-it may feel really stressful but it's like a good kind of stress cos you know it helps you to get further things done. (P15)*

Furthermore, participants commonly described having a goal that justified their input:

*...cos it's a challenge you feel like you're working towards something ... you worked really hard and you got something out of it and you feel like it was worth it (P2)*

Finally, participants feel actively eager to face the situation, having a real influence on the outcomes and being able to *"actually do something"* (P1).

The phenomena described here are broadly comparable with the adult-focused literature, which likewise contrasts hope with hopelessness (Le Fevre et al., 2003) and dread with pleasure (Rice, 1999). However, one noteworthy feature failed to resonate with current participants: meaningfulness, described as the extent to which a situation is worthwhile and contributes to a purposeful life (Nelson & Simmons, 2003). Although participants did describe eustress as worthwhile, they did not echo the more grandiose sense of purpose. This is consistent with developmental literature positing adolescence as an initial stage towards the eventual cultivation of a sense of purpose (Damon, Menon, & Bronk, 2003).

#### 4.3.4.3.2 Low vs high self-regard

The majority of participants described distress as indicated by feelings of low self-regard, not being “happy with yourself” (P8), and feeling responsible for the negative situations in their life. In light of these feelings of self-blame, some participants described being “really mad at myself” (P16). Other infrequently mentioned instances of low self-regard included participants being intensely self-conscious and feeling that they had let themselves and others down. Divergently, participants commonly outlined that during eustress they had a favourable self-impression:

*I just feel really confident and umm and like- not in many situations do I feel really like happy with myself. (P1)*

Taken to extremes, some participants described feeling like the best possible version of themselves when under pressure. Participants also occasionally described a sense of accomplishment and pride or a more passive feeling of satisfaction with their effort:

*...with good stress you always feel ... a bit like ‘I really, like I’m pretty proud of myself. There were lots of things that like challenged me today but umm like I overcame them and like I did good’ (P1)*

Although these results broadly align with past research (Lazarus, 1990; Rice, 1999), self-regard has not been a leading focus in the adult-focussed literature. This is understandable however when considering developmental theory, which suggests adolescents are more egocentric than adults (Passer & Smith, 2013).

#### 4.3.4.4 Affect

This theme captures the emotional, affective landscape of the participant. Supporting the Holistic Model of Stress (Nelson & Simmons, 2003), the two stress

responses were distinguishable by affective state, with all participants associating negative emotional tension with distress and positive, high spirits with eustress.

#### 4.3.4.4.1 *Sadness vs. happiness*

An extensively described indicator of distress was considerable sadness or “((crying)) like not good feelings” (P15). These negative emotions were occasionally described to commute to grumpy sullenness. More severely, certain participants described clinical feelings of depression and morbid thoughts. Asymmetrically, the majority of participants identified overall happiness as symptomatic of eustress:

*I find like with good stress like it’s actually like a good feeling like it’s not- it’s like not just like good stress I actually find good stress like a good feeling (P7)*

Commonly, participants reported tangibly observing these positive emotions in others by way of laughing and smiling. The distinction conforms with the adult-focussed literature (Rice, 1999).

#### 4.3.4.4.2 *Infuriated vs composed*

Distress has previously been postulated to be indicated by various aspects of passionate umbrage (e.g. Nelson & Simmons, 2003; Rice, 1999), a suggestion echoed by the current participants. Anger was frequently associated with distress and was constructed as a psychological state that was expressed through hostile, aggressive behaviour and “blow[ing] up in a rage” (P16). Some participants also outlined that they were perpetually bad-tempered, so that “things can make you angrier more easily” (P9). Further, participants commonly described being irritated, frustrated, and flustered:

*My mum always asked like 'are you ok?' and stuff and like little things would just aggravate me like that. Like I know they're trying to care but it would just frustrate me. (P1)*

Contrastingly eustress was described as being indicated by a sense of composure, with participants *"content"* (P15) and *"calm and collected all the time"* (P1). These emotions were not constructed as positive, but as an easy acceptance of pressure. This sense of composure has not been previously suggested as an indicator of eustress in the adult-focussed literature, making this subtheme particular to the current study.

#### 4.3.4.4.3 *Angst vs excitement*

The majority of participants described distress to be indicated by a suite of angst-ridden emotions. The key indicator here was fear, with participants commonly describing feeling scared when experiencing distress:

*Bad stress you know before public speaking and stuff like that you know I'd sit there and kinda stress myself out about it and wouldn't want to go up and do it, or go up and do it and get all shaky cos I'm so scared (P7)*

When taken to extremes, participants commonly described going into *"panic mode"* (P2). Anxiousness was also commonly described to be indicative of distress. Largely, the term 'anxiety' was used to refer generally to emotion, however, the one participant reporting a diagnosed anxiety disorder identified distress as exacerbating her symptoms.

Contrastingly, all participants described a sense of excitement when experiencing eustress:

*I'm probably a little bit boisterous a bit excited about what's gonna happen so like almost as if like I'm not able to contain it within myself (P4)*

Associatively, participants also commonly experienced “*adrenaline rushing*” (P20) and pleasantly queasy ‘butterflies’. This distinction resonates with extant literature (Hargrove et al., 2011; Rice, 1999).

Participants frequently described feeling ‘nervous’ during both distress and eustress. However, when discussing distress, the term ‘nervous’ referred to a negative state of apprehension and unease while to be ‘nervous’ when eustressed was to be experiencing a positive sense of excited anticipation. Despite this difference in meaning, participants frequently described experiencing ‘nervous energy’ during both stress responses, characterised by restless, “*fidgety*” (P7), behaviours.

#### **4.3.4.5 Constitution**

This dimension captures the soundness of the body and mind in response to stress. Parker and Ragsdale (2015) argue that the experience of distress depletes energy resources, while eustress helps to replenish them. Harmoniously, researchers have associated distress and eustress with disturbed and invigorated body states respectively (Kozusznik et al., 2015; McGowan et al., 2006; Nelson & Simmons, 2003). Current findings support this distinction, with distress extensively associated with debilitation and eustress frequently linked with heartiness.

Participants frequently associated distress to be indicated by a generally poor state of physical health:

*Well I was always- cos I was so stressed like I was always really sick like my- like physically sick (P3)*

Distress was extensively linked to physical fatigue and tiredness, wherein the “*whole body sort of just like shuts down*” (P1), as well as a state of complete mental exhaustion.

Participants also commonly described feeling lethargic and listless:

*...everything was just dull and I just couldn't be bothered dragging myself from lesson to lesson (P6)*

Further, beyond the strictly physical, distress was infrequently associated with poor “mental health” (P2). Contrastingly, during eustress, participants commonly reported feeling energised, possessing an abundance of vitality that translates into energetic behaviour:

*I know when I'm in a positive stress mood ... I'll run to the other end of the house to grab something ... then I'll run back and just be jumping up and down (P6)*

Associatively, participants characterised the eustress response as behaviourally lively, being boisterous, bubbly, and “really loud and rowdy” (P20). In addition, one participant described eustress as a time of being physically well:

*I was just generally really healthy like I didn't really have any problems like I di- I never got sick (P3)*

#### **4.3.4.6 Connection**

This theme encapsulates the connections adolescents have with their world when responding to pressure. All participants described detachment as symptomatic of distress, while participants frequently characterised eustress as a time of connection. P6 captured this dichotomy, noting that “when I go through bad stress I kinda just sit there on my- well I isolate myself almost. Like I won't engage as much” but during eustress he experiences “...the opposite of negative I suppose. I-I am often more umm engaged and social”

#### 4.3.4.6.1 *Disconnected vs connected with environment*

The majority of participants described distress as a time of increased disconnection from their environment, feeling *“dead to the world”* (P1). Participants commonly described being uninterested in their environment:

*[My friends] don’t really wanna go get involved in something if we’re going and kicking the footy they’d be like ‘nah I’ll just stand here’ (P11)*

Participants commonly described being so unenthusiastic that they *“don’t want to do anything”* (P8). Contrastingly, certain participants associated eustress with increased engagement with their environment, being *“more interested in doing everything and like getting into stuff”* (P13). These findings resonate with the adult-based research, which likewise associates distress with withdrawn alienation and eustress with enthusiastic engagement (e.g. McGowan et al., 2006; Nelson & Simmons, 2003).

#### 4.3.4.6.2 *Disconnected vs connected with people*

Participants frequently described a desire for solitude when distressed:

*I kinda like lock myself down a bit like I really just don’t really want to talk to anyone else, my mind and body just wanna be like one (P11)*

Concordantly, certain participants described a complete emotional disconnection from others during distress, becoming highly insular. Contrastingly, during eustress, some participants were more socially connected with their peers. Participants outlined that these states of social connection were recognisable in an individual’s behaviour towards others. Participants commonly described ‘taking it out on others’ during distress:

*There are I guess like little things like lashing out at people like- I think bad stress just leads to bad behaviour (P15)*

In comparison, participants commonly reported behaving positively towards other during eustress:

*I found myself trying like wanting to do more things, like wanting to see-catch up with my friends, wanting to do the Good Samaritan things (P3)*

Social connection is relatively unexplored in the adult literature, suggesting this subtheme may be particular to adolescents. This is consistent with developmental research suggesting young people place immense value on relationships, being highly concerned with peer relations when compared to adults (Siegler, DeLoache, & Eisenberg, 2011). Additionally, when reflexively elaborating during member checking, participants noted that, unlike adults, adolescents are often in near-constant contact with others, attending group education, living dependently, and engaging with social media.

#### **4.3.5 Conclusion**

The current study describes the phenomena identified by adolescents as relevant indicators of the stress response. By taking a qualitative approach, the results contribute to a deeper understanding of this unexamined area of research and serve to 'give voice' to adolescents.

Six themes were proposed, representing key dimensions along which eustress and distress are differentiated in adolescents. Eustress was described to be indicated by a positive state of mind, beneficial functioning, greater perceived efficacy, positive emotions, hearty constitution, and a connection with the world. Contrastingly, distress was indicated by a negative state of mind, adverse functioning, lower perceived efficacy, negative emotional tension, debilitation, and detachment from the world. Together, these results appear to be indicative of more short-term responses to pressure, rather than chronic, long-term stress.



Although many of the identified phenomena were comparable to those proposed by the adult-focussed literature, current participants demonstrated a range of distinctive perspectives. Departing from the extant literature, personal connections and self-regard were considered salient indicators of the stress response, while meaningfulness was not considered a pertinent phenomenon. These findings are understandable when considering the distinctive developmental characteristics of adolescents, namely that they are egocentric, place great importance on peer relations, and have not yet fully developed a sense of purpose (Damon et al., 2003; Passer & Smith, 2013; Siegler et al., 2011).

#### **4.3.5.1 *Scope of application***

Qualitative studies are frequently criticised for their lack of generalisability (Pope & Mays, 2006). However, the application of this more quantitative notion to qualitative research is controversial (Grbich, 1999). Certainly qualitative results are not generalisable in the way quantitative results are, however, they do bear relevance outside their original context (Braun & Clarke, 2013). Transferability, proposed as a more flexible generalisability, considers if the qualitative results can be ‘transferred’ to different contexts (Braun & Clarke, 2013).

One approach to transferability is to examine the extent to which a study’s sample includes the full range of potentially relevant cases (Pope & Mays, 2006). To this end, the study employed maximum variation sampling and continued interviewing past saturation, such that the sample represented many possible factors that may have affected the variability of experiences. While this robust and thorough sampling method is a strength of the current study, the choice of variation factors (age, gender, academic institution and achievement) were necessarily restricted so as to result in a pragmatically manageable sample size. Future research could look to examine other factors with

potential to affect variability of experience, such as ethnicity, socio-economic status, and being unengaged with the educational system. Overall, the results should be considered not as generalisable to every adolescent population, but as transferable to similar contexts.

#### **4.3.5.2 Limitations**

The current methodology respected the developmental level of participants, taking care to ensure ethical and age-appropriate practices. Nevertheless interviews were inevitably characterised by an authority imbalance between participant and interviewer due to differences in age, knowledge, and power (Hewitt, 2007). This may have contributed to two related limitations. Firstly, participants may have modulated their response to provide answers they supposed the interviewer was expecting, consistent with the 'correct-answer' habit expected by schoolteachers (Hatch, 1995). Secondly, as discussed, there is reason to suggest participants were supplying socially desirable responses. These biases may have inhibited participant's responses.

#### **4.3.5.3 Future directions**

In pursuing the creation of a novel measure of the adolescent stress response, the current study prioritised the perspectives of young people. As salient dimensions of the adolescent stress response, the results suggest a novel distress-eustress scale may encompass state of mind, function, perceived efficacy, affect, constitution, and connection. Such a scale would reflect and respect the unique experiences, circumstances, and perspectives of adolescents.

#### **4.3.5.4 Conclusion**

The literature exploring the indicators of the stress response is limited by its exclusive focus on the adult context. In examining adolescents' lived experience of stress, current participants proved unique in a number of facets. These idiosyncrasies reiterate

the inappropriateness of directly translating adult-focussed literature to the adolescent context and emphasise the need for stress research to reflect and respect the unique experiences of young people.

## **CHAPTER 5. CREATING THE ADOLESCENT DISTRESS-EUSTRESS SCALE**

The qualitative study presented in Paper 1 identifies salient and relevant phenomena that can act as pertinent effect indicators of the adolescent stress response. These results provided the foundation for the creation of the ADES. Illustrating the importance of meticulous scale creation, Dillman et al. (2014) state:

...to generate a good estimate we have to write a question that every potential respondent will be willing to answer, will be able to respond to accurately, and will interpret in the way the surveyor intends. We then have to organise those questions into a questionnaire ... Doing these things requires us to make many design decisions. Making the right decisions will minimise measurement and nonresponse error, while making the wrong decisions might increase them. (p. 94)

Therefore, in order to establish evidence-informed guidelines for item creation, literature on questionnaire development was reviewed. This chapter describes the theoretical considerations and empirically validated procedures used to methodologically generate an initial pool of candidate items for inclusion in ADES and determine the format of measurement.

### **5.1 Format of Measurement**

#### **5.1.1 Scale Modality**

Broadly, the ADES was designed as a multi-item scale, as this modality is suggested to better avoid bias, misinterpretation, and reduce measurement error when compared to single-item scales (e.g. Rattray & Jones, 2005). As distress and eustress are considered related, but distinct constructs (see the partial-consensus definition of stress

in Section 3.3, p. 93), the scale was designed to consist of individual subscales indexing each stress response. Further considerations are expanded upon below.

#### **5.1.1.1 Question type**

Close-ended questions were utilised over open-ended questions. The strength of open-ended questions is that they allow respondents to answer freely and provide in-depth responses (Dillman et al., 2014; Rattray & Jones, 2005). However, they also require more respondent input, are open to non-response bias, and require coding before analysis (Dillman et al., 2014). Close-ended questions overcome these weaknesses, albeit at the expense of more detailed responses.

#### **5.1.1.2 Survey mode**

As outlined in Section 1.3.1 (p. 16), self-report measures are considered the “method of choice in measuring adolescent stress” (Byrne et al., 2007, p. 395). Self-report measures are argued to provide anonymity and privacy (Fan et al., 2006), remove issues of interview bias (Fan et al., 2006), are inexpensive (de Leeuw et al., 2004; Fan et al., 2006), and are considered suitable for use in children and adolescent populations (Bell, 2007; de Leeuw et al., 2004). They are also suggested to be less likely to induce socially desirable responses when compared to interviews, although some researchers argue this is hampered when delivered in a classroom situation (Fan et al., 2006; Nederhof, 1985). Importantly for the current thesis, asking adolescents to self-report on their own experience ensures they are positioned as the experts in their own life (see Section 2.3.3.1, p. 65). As such, this survey mode was selected in creating the ADES.

However, limitations of self-report modes should be kept in mind. Compared to interview delivered modes, self-report surveys have the potential for less complete data collection, more misunderstood questions, and lower response rates (Fan et al., 2006).

Further, self-report measures can be transparent to the respondent and therefore easy to fake (F. Jones & Kinman, 2001).

#### **5.1.1.3 Delivery mode**

Although able to be completed on paper, the ADES was specifically designed to be delivered online. This delivery mode is considered to be highly advantageous when compared to traditional paper-and-pencil delivery as large amounts of responses can be inexpensively collected in a short amount of time, the results are available for analysis immediately, it allows for more advanced questionnaire design features, and is easily delivered to isolated or distant populations (e.g. Dillman et al., 2014). Further, children and adolescents are reported to actively enjoy this mode of survey delivery (de Leeuw et al., 2004). However, the use of online delivery mode necessarily limits delivery to populations with internet and technology access, potentially leading to restrictive and biased sampling.

#### **5.1.1.4 Type of scale**

The ADES was designed to be evaluative and descriptive, with the intention of characterising and describing the positive and negative stress responses. The measure was not created with the intention of being prescriptive, which is to say that it does not offer any specific diagnostic criteria<sup>14</sup> (Kern et al., 2016).

#### **5.1.2 Scale Pre-ambles**

A scale's pre-ambles provides clear, helpful introductory text, including definitions and instructions as to how to complete the scale. Dillman et al. (2014) emphasise that scale developers must carefully select the wording of the pre-ambles so as to avoid influencing respondents' answers in unintended ways. Further, as young people take

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<sup>14</sup> However, this is a fertile area for future research; see Section 9.5.3, p. 316.

longer than adults to process information, it is recommended that scales intended for younger respondents be made up of short, simple sentences (Bell, 2007). When creating the pre-ample for the ADES, two key considerations were kept in mind: 1) the time frame to which the instructions refer and, 2) the connotations of the words used to describe the stress response.

#### **5.1.2.1 Questionnaire time frame**

The scale pre-ample establishes the period of time that respondents should reflect upon when answering each questionnaire item. There are few guidelines regarding the time period during which stress response should be assessed (F. Jones & Kinman, 2001; Mullis et al., 1993). As such, the time frame was deliberately chosen for three reasons: theory, recall, and comparability.

DeVellis (2012) suggests that questionnaire time frames should predominantly rely on theory pertaining to the nature of the construct of interest; for the current context, that is whether the stress response should be considered as a state or trait variable. Traits are fundamental, enduring, stable characteristics of the individual and as such trait-questionnaires tend to imply a universal perspective by avoiding making reference to any time frame (DeVellis, 2012; Stuart-Hamilton, 2007). States, on the other hand, are temporary, transient, and dependent on circumstance, and so state-questionnaires reference short, recent time frames (DeVellis, 2012; Stuart-Hamilton, 2007). As outlined in Section 3.3 (p. 93), it has been argued that an individual's stress appraisal and consequent response is influenced both by the environmental characteristics of the stressors and relevant individual differences. Considering environmental demands, the relevant characteristics of the stressors (e.g. amount, type, recency; Le Fevre et al., 2003) are circumstantial and temporary, meaning the stress response may be considered as predominantly transient. Supporting this, research

demonstrates the stress response is unstable across time, with the test-retest reliability of stress scales adequate over a two week period (Compas et al., 1987) before rapidly dropping off after 4-to-8 weeks (S. Cohen et al., 1983). However, considering relevant characteristics of the individual (e.g. locus of control, sense of coherence; Nelson & Simmons, 2003), it is reasonable to expect that pertinent individual differences include various stable traits and that an individual may therefore be somewhat predisposed to appraising a stressor as either distress or eustress. Overall though, the current thesis considers an individuals' stress response to be more broadly a state than trait variable.

The second consideration was to ensure the questionnaire did not ask respondents to recall a period of time longer than they are cognitively able (Dillman et al., 2014). Overall, as young people have lower recall ability than adults, it is recommended in the literature that questionnaires for adolescents be based in the 'here-and-now' (Bell, 2007).

The final consideration was comparability to existing stress measures. Reviewing existing response-oriented stress scales (Table 11), previously utilised time frames were relatively recent, considering at a maximum the 'last month'. Some scales did not refer to any time frame, however, this is inconsistent with the above theoretical considerations for a state variable and therefore was not considered appropriate for the current context.



Table 11

*Examples of Time Frames Utilised by Response-Oriented Stress Scales Appropriate for Use in Populations of Young People*

Stress Measure	Time Frame
Perceived Stress Scale (S. Cohen et al., 1983)	Last month
DASS (Lovibond & Lovibond, 1995)	Past week
Academic stress questionnaire (Lakaev, 2009)	Past 7 days
Academic Eustress Scale (O'Sullivan, 2011)	No time frame
Stress Response Scale for Adolescents (Curtis & Adams, 1991)	Currently experiencing

Taking into account all of the above considerations, it was considered that a short, recent time frame to be most appropriate for the ADES and the choice was made to refer to a time frame of a week: *'in the last 7 days'*.

#### **5.1.2.2 Stress specific clarity**

Consistent with previous research that lay people tend to define stress negatively (e.g. F. Jones & Bright, 2001b), it was incidentally observed that 80% of participants in the Paper 1 qualitative study saw the word 'stress' as having only negative connotations. Given this negative association the choice was made to entirely omit the word 'stress' from the scale, so as not to prime or bias respondents. Instead the stress process was referred to in terms of *'how you respond to pressure'*. The term 'pressure' was chosen as an appropriate synonym for stress as it's Macquarie Dictionary<sup>15</sup> definition of 'a constraining or compelling force or influence' was judged to have suitably neutral connotations. Further, this term was successfully used in the Paper 1 qualitative interviews when defining and discussing distress and eustress with the adolescent participants (see Paper 1 Interview Guide in Appendix C).

<sup>15</sup> The Macquarie Dictionary is considered the standard reference for Australian English

### 5.1.2.3 Draft scale pre-amble

Taking into account the above considerations, the following draft scale pre-amble was constructed:

*These questions are about **how you respond to pressure**.*

*Everybody responds to pressure differently at different times. Pressure can be good for you, bad for you, or a bit of both.*

*Please read each item below and choose the answer that best describes how you responded to pressure in the last 7 days.*

*There are no right or wrong answers.*

## 5.2 Generating the Initial Item Pool

Paper 1 emphasised the inappropriateness of directly translating adult-focussed literature to the adolescent context and reiterated the need for a measure of stress incorporating young peoples' unique experiences. Item content was thus developed through collaboration with adolescents rather than by adapting adult inventories (Byrne et al., 2007; Compas et al., 1987). Along with the definitions conceived for distress and eustress in Chapter 3, results of the thematic analysis reported in Paper 1 served as the foundation for item development and provided a vast pool of phenomena that could act as salient, relevant, and pertinent indicators of the stress response. This ensured items were relevant to the prospective adolescent respondents (Compas, 1987b; Dillman et al., 2014).

Utilising the codes and themes from Study 1, prospective questionnaire items were generated to be reflective of the underlying constructs of distress and eustress (DeVellis, 2012; Hargrove et al., 2014). Table 12 gives an example of these initial steps of item creation.

Table 12

*Example of Item Creation for the ADES*

Code Name	Code Description	Relevant Participant Extract	Proposed Items
Unable to focus	The inability to concentrate/ focus on what one is doing. More easily distracted.	<i>“So I- like when I experience stress I feel like to me the whole experience is just like fuzzy, so like my head is just fuzzy and I can’t concentrate on what I’m doing but I can’t, like, yeah.”</i>	I couldn’t concentrate I couldn’t focus It was easier to distract me Concentrating was harder It was harder to concentrate It was harder to focus I got distracted more easily I found concentrating was harder I found focussing was harder I found it was harder to concentrate Pressure made it harder to concentrate Pressure made concentrating more difficult I was easily distracted

To ensure subscales were unidimensional, item creation sought to maximise the distinct features between distress and eustress and minimise their commonalities (e.g. Churchill, 1979; Corr & Cooper, 2016; Nunnally & Bernstein, 1994). Therefore, no items were based on phenomena identified as symptomatic of both stress responses. Furthermore, to minimise confounding in the measure (see Section 1.3.1.2.4, p. 34), a clear distinction was made between the indicators and the outcomes of the stress response (e.g. Compas, 1987b; see Section 9.4.1.1, p. 308, for further discussion).

During the item generation stage of scale development, DeVellis (2012) suggests that the expression of ideas take precedence over item quality. Within CTT (see Section

2.3.1, p. 53), it is assumed that each candidate scale item represents a sample of the possible universe of items tapping into the construct at issue, such that each item is considered a relatively equivalent detector of the stress responses (Churchill, 1979; Corr & Cooper, 2016; DeVellis, 2012). Having many items in the initial pool is argued to allow the scale developer to articulate a wide variety of ways of expressing the central constructs and is considered ‘insurance’ against poor internal consistency; the more items you have to choose from, the more discriminating you can be in choosing them (DeVellis, 2012). The initial item pool for the ADES was therefore constructed to be large and over-inclusive, consisting of 463 items (262 distress, 201 eustress; see Appendix D). However, while it is advantageous to have many candidate items in initial stages of scale creation, an item pool of this size cannot be pragmatically delivered to adolescent respondents (DeVellis, 2012). As such, the initial pool was refined through a systematic review process, described in the next chapter.

### **5.2.1 Evidence-Informed Guidelines for Writing Questionnaire Items**

Psychometric literature was reviewed to establish evidence-informed guidelines for writing effective questionnaire items. Each candidate questionnaire item was written following these guidelines, thus mitigating related respondent motivational and comprehension problems (Dillman et al., 2014).

#### **5.2.1.1 Guideline 1: Use simple and clear language**

While survey research is considered feasible with young people from ages seven and older (Bell, 2007), adolescent development affects young respondents’ ability and tendency to answer survey questions (Bell, 2007; de Leeuw et al., 2004; Zuckerberg & Hess, 1996). As such, items for the ADES were deliberately designed to suit the cognitive, linguistic, and social competence of adolescents (de Leeuw et al., 2004). To ensure that items were simple and clear for this age group, established standards related to

questionnaire syntax, language, and grammar were followed, with allowances made for specific adolescent development, summarised in Table 13.

Table 13

*Established Guidelines for Creating Simple and Clear Adolescent Questionnaire Items*

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Short items (Bell, 2007; Corr & Cooper, 2016; DeVellis, 2012; Dillman et al., 2014)
Straightforward syntax (Bell, 2007; Dillman et al., 2014)
Use unambiguous language (Bell, 2007; Corr & Cooper, 2016; DeVellis, 2012)
Avoid ambiguous pronoun use (DeVellis, 2012)
Avoid double-barrelled items (Bell, 2007; Churchill, 1979; Corr & Cooper, 2016; DeVellis, 2012; Dillman et al., 2014; Rattray & Jones, 2005)
Avoid hypothetical items (Bell, 2007)
Utilise appropriate reading level for audience (DeVellis, 2012; Dillman et al., 2014; Johnson, Burke, Brinkman, & Wade, 2016)
Avoid double negatives (DeVellis, 2012; Dillman et al., 2014; Rattray & Jones, 2005)
Grammatically correct (DeVellis, 2012)
Use noun rather than adjective word forms (DeVellis, 2012)
Consider unintended meanings (DeVellis, 2012)
Use simple, familiar words (Dillman et al., 2014)
Only use jargon and abbreviations when recognised by all audience (Dillman et al., 2014)
Use specific, concrete words (Dillman et al., 2014)
Use complete sentences (Dillman et al., 2014)
Present information logically (Dillman et al., 2014)
Carefully check depersonalised or indirect questions (Bell, 2007; de Leeuw et al., 2004)
As moderation of opinion expressed in the response option, items should be written to be strong (DeVellis, 2012)

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### **5.2.1.2 Guideline 2: Avoid negatively phrased questions**

In questionnaires designed for adult respondents, researchers have traditionally argued that a balance of positively and negatively phrased questions enhances data quality and avoids response set biases (Bell, 2007; Churchill, 1979; DeVellis, 2012; Rattray & Jones, 2005). However, recent research suggests that negatively phrased questions are ineffective in dealing with response bias and can cause spurious multidimensionality (Corr & Cooper, 2016). Furthermore, moving between phrasing structures can confuse participants (Corr & Cooper, 2016; DeVellis, 2012) and this is especially evident when respondents are young people (Bell, 2007). Considering these factors, it was considered that the disadvantages of including negatively phrased items outweighed the advantages and as such all items were positively phrased.

### **5.2.1.3 Guidelines 3: Mitigate social desirability**

Social desirability bias refers to respondents' tendency to distort questionnaire responses to reflect socially desirable traits and deny socially unacceptable ones (Nederhof, 1985). It is argued that this bias is heightened for adolescent respondents, as they are more sensitive to peer pressure and group norms (de Leeuw et al., 2004). To mitigate issues of social desirability in the ADES, the choice was made to avoid 'threatening' or sensitive questions, biasing language, and questions with an obvious socially accepted response (Churchill, 1979; Dillman et al., 2014; Nederhof, 1985). For example, while Paper 1 identified clinical feelings of depression as an effect indicator of distress, no items were created for this as it was considered to be potentially sensitive. The effect of social desirability on the scale was also subsequently statistically examined during psychometric evaluation (see section 7.2.3.4.1, p. 206).

#### **5.2.1.4 Guidelines 4: Enhance variability**

A scale cannot co-vary unless it can vary, meaning that items with a narrow range of responses will correlate poorly with other items and measures (DeVellis, 2012). To take an extreme example, if all participants responded to an item identically, the item would have no variance and it would not discriminate between individuals with different levels of the construct being measured. Item wording must therefore encourage and maximise individual differences and variance (Churchill, 1979; Compas, 1987b; DeVellis, 2012). In the current context, this was achieved by ensuring that ADES items encouraged a range of responses and did not have an 'obvious' response that the majority of participants would select. For example, while Paper 1 identified 'weight change' as symptomatic of distress no item was created regarding this effect indicator as it was suspected responses would cluster around the extremes of response options (i.e. participants would either respond indicating they had or had not experienced weight gain, rather than providing a range of responses). As suggested by DeVellis (2012), actual item variances were statistically inspected during the Evaluation stage by examining item distributions (see section 7.2.3.4.1, p. 206).

### **5.3 Response Option Format**

Accurate measurement is considered to rely both on the wording of the items and on the effect the response option has on those items (Nadler, Weston, & Voyles, 2015). The development of items according to CTT is considered to be compatible with a variety of response option formats (DeVellis, 2012). After reviewing various format options (see DeVellis, 2012 for a succinct review), a Likert-type scale was selected as it is considered the preferred instrument for large scale-psychology research ("Likert scale,"

2002), has proven successful in diverse applications (DeVellis, 2012), and is a relatively simple method of obtaining data (Mellor & Moore, 2013).

Strict Likert scales present items as a declarative statement followed by a number of response options indicating level of agreement with that statement, worded to have roughly equal intervals (DeVellis, 2012). Likert-type scales are almost indistinguishable, except that response options indicate varying degrees of personal endorsement of the statement, rather than agreement (Nadler et al., 2015). A Likert-type scale was judged to better suit the syntax of the drafted candidate items.

### **5.3.1 Number of Response Options**

There is no agreement in the literature on the optimum number of response options for a Likert-type scale (S.-O. Leung, 2011). It is argued that the number must balance the simplicity of the scale with the maintenance of appropriate psychometric properties, with evidence suggesting that reliability and validity is strongest in 4- to 7-point scales (Nadler et al., 2015). However, research has found young people can typically only manage four or five response options (Bell, 2007).

When deciding between 4- or 5-point scales it was important to consider that the latter allows for a midpoint response option, which is controversial within the literature (e.g. DeVellis, 2012). Including a midpoint allows participants the option to avoid making a clear choice (DeVellis, 2012) and has been found to increase central tendency and social desirability biases (S.-O. Leung, 2011; Nadler et al., 2015). However, excluding a midpoint forces genuinely moderate participants to make an erroneous choice, potentially increasing error (Nadler et al., 2015) and leading to respondent irritation and non-response (Rattray & Jones, 2005). However, a recent empirical comparison of 4-, 5-, 6-, and 11-point scales found no differences in internal response structure between odd and even point scales, suggesting that a midpoint option made no statistically material



effect on the scale (S.-O. Leung, 2011). As such, it was judged that the benefits of including a midpoint outweighed the disadvantages and the choice was made to utilise a 5-point Likert-type scale for the ADES (shown in Figure 13).

<b>Not like me</b>		<b>Somewhat like me</b>		<b>Very much like me</b>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*Figure 13.* Response options for ADES items. *Note.* The circular symbols represent the button that respondents click on the online version of the questionnaire.

For the ADES, the midpoint was intended to be used by participants to express moderate endorsement of the item. However, a recent qualitative investigation showed that individual respondents interpret the meaning of a midpoint differently, with the most common interpretations being ‘no opinion’ followed by ‘unsure’ and ‘neutral’ (Nadler et al., 2015). To ensure that respondents interpreted the midpoint as intended, the wording of this response option was chosen to carefully and specifically define its purpose. Some Likert-type scales also offer respondents a non-substantive response option such as ‘I don’t know’ or ‘No opinion’. The choice was made to exclude such an option for the ADES, as young people have been found to have a tendency to opt for this non-substantive response due to boredom, disengagement, and ease (Bell, 2007).

### 5.3.2 Scoring System

According to CTT, as scale items are imperfect indicators of a common phenomenon they can be combined using simple summation scoring into an acceptably reliable scale (DeVellis, 2012). As such, it was decided that scores on the two ADES subscales be determined by a summation of the numbered response options across relevant items. The scoring system for individual items is shown in Figure 14.

Response option	<table><tr><td colspan="2">Not like me</td><td colspan="2">Somewhat like me</td><td>Very much like me</td></tr><tr><td><input type="radio"/></td><td><input type="radio"/></td><td><input type="radio"/></td><td><input type="radio"/></td><td><input type="radio"/></td></tr></table>					Not like me		Somewhat like me		Very much like me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Not like me		Somewhat like me		Very much like me											
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>											
Score	0	1	2	3	4										

*Figure 14.* Scoring system for individual ADES items.

Controversy exists in the literature as to whether to treat sum scores as ordinal or interval data. In Likert-type scales, data from individual items are clearly ordinal, however, the total summation score is usually treated as interval-level as this makes analysis more powerful and easier to interpret (DeVellis, 2012; S.-O. Leung, 2011; Nunnally & Bernstein, 1994). Empirical evidence suggests sum scores can be considered at an interval-level, dependent on appropriate validity and reliability of the scale (S.-O. Leung, 2011; Nadler et al., 2015). Indeed, it has been suggested that treating data at an interval level, even when it is not, makes very little analytic difference (Nunnally & Bernstein, 1994). In general, the greater the sophistication of the research hypotheses and associated analysis, the more carefully these assumptions need to be considered (Nunnally & Bernstein, 1994).

#### 5.4 Summary

Using the vast pool of salient and relevant phenomena identified in Paper 1 as potential indicators of the stress response, an initial pool of 463 items (262 distress, 201 eustress) was generated for the ADES. These items, along with the scale pre-ambles and response option format, were created with theoretical and practical considerations in mind and followed evidence-informed guidelines. The initial item pool and drafted pre-ambles were next submitted to a thorough review process to ensure clarity, developmental appropriateness, relevance, content validity, and overall robustness, outlined in the following chapter.

## **CHAPTER 6. REVIEWING THE ADOLESCENT DISTRESS-EUSTRESS SCALE**

It is agreed within the literature that the development of a questionnaire requires extensive piloting to identify any problems and to consequentially improve or refine the content, mode, and wording (e.g. Conrad, Blair, & Tracy, 1999; Drennan, 2002; Rattray & Jones, 2005; Van Teijlingen & Hundley, 2002). As such, the next step in developing the ADES was to submit the scale items and pre-ambles to thorough review. Through this reviewing process, known as pre-testing, the initial pool of 463 items was refined, improved, and combined to form a cohesive questionnaire ready for psychometric evaluation.

Pre-testing refers to the process of delivering the draft questionnaire to individuals with specialised knowledge and asking them to report any problems experienced (Dillman et al., 2014). These individuals can consist of persons with expertise in the subject matter and/or members of the intended survey population (Dillman et al., 2014). Common pre-testing methods include subject matter expert (SME) reviews, cognitive interviewing, focus groups, and experimental evaluations (see Dillman et al., 2014 for a detailed summary of these methods). Pre-testing a questionnaire is considered to be a cost-efficient method of providing insight into the adequacy of item wording and response options (de Leeuw et al., 2004) and allows the researcher to recognise and resolve problems with the questionnaire before it is delivered to the development sample (Conrad et al., 1999; Dillman et al., 2014). If such issues remain unresolved, the potential for error during questionnaire evaluation is significantly increased (Conrad et al., 1999; Dillman et al., 2014). However, there are limitations to conducting pre-testing methods. As pre-testing and other pilot studies are often based on very small numbers of participants they can result in inappropriate predictions and assumptions (Van Teijlingen & Hundley, 2002). Further, pre-testing can require significant

investments of resources and does not guarantee the success of the full questionnaire (Van Teijlingen & Hundley, 2002).

This chapter outlines the three methods undertaken to thoroughly review and pre-test the ADES: a SME review, a readability review, and a cognitive interview review. These methods are considered in the literature to be the most appropriate for the intended adolescent respondent population (e.g. Dillman et al., 2014).

## **6.1 Subject Matter Expert Review**

A SME review involves identifying a group of people knowledgeable in the content area of a prospective measure and asking them to review the draft item pool, with the aim of maximising the content validity and overall robustness of a scale (Bell, 2007; DeVellis, 2012). Such reviews can involve asking the SMEs to compare items to construct definitions, make suggestions to improve item quality, suggest additional items, or identify items for deletion (DeVellis, 2012; Hargrove et al., 2014).

### **6.1.1 The Current Subjective Matter Expert Review: Method and Results**

The current SME review involved three consecutive stages: an item quality review, a content validity matrix, and a final item review. The individuals identified as SMEs consisted of the psychological and educational researchers making up the supervisory panel of the current thesis plus four additional psychology researchers within the University of Adelaide. Through the informed application of the SME's advice, draft items were modified, added and/or deleted, and combined to form a cohesive questionnaire. However, it is important to note that while careful attention was paid to the SME feedback, the final judgement about the scale's construction lay with the thesis author.

#### **6.1.1.1 Stage 1: Item quality review**

In the first stage of the SME review, the supervisory panel systematically reviewed the initial 463 items, commenting on the items' clarity; difficulty and developmental appropriateness; relevance; sensitivity; and wording, language, and grammatical structure (DeVellis, 2012; Dillman et al., 2014; Hargrove et al., 2014; Johnson et al., 2016; Spilsbury, Drotar, Rosen, & Redline, 2007; Sterba et al., 2007; Zukerberg & Hess, 1996). They were also asked to consider how well the proposed items represented and captured the intended effect indicator (Kern et al., 2016). With these considerations in mind, they suggested item modifications and additional ways of capturing the effect indicators, and aided in reducing the size of the large, over-representative item pool by identifying useless item redundancies (DeVellis, 2012).

Overall, the supervisory panel identified 200 items as redundant and suggested 35 additional wordings be added. Reviewing these suggestions, the following changes were made to the item pool:

- 131 items were removed from the distress subscale pool. One item marked for removal by the SMEs was retained at the discretion of the author.
- 20 items were added to the distress subscale pool. 2 additional items suggested by the SME were rejected for being non-discriminatory and vague.
- 65 items were removed from the eustress subscale pool. 3 items marked for removal by the SMEs were retained at the discretion of the author.
- 13 items were added to the eustress subscale pool.

The revised item pool therefore consisted of 149 potential eustress items and 151 potential distress items.

### 6.1.1.2 Stage 2: Content validity matrix

Content validity refers to the extent to which a set of items appropriately and veraciously reflects the intended content domain (DeVellis, 2012). To assess the content validity of the remaining 300 prospective scale items, the seven SME researchers were asked to classify each item according to a content validity matrix (Figure 15), with results used to assess how well each item reflected the intended construct (DeVellis, 2012; Hargrove et al., 2014; Kern et al., 2016).

	Somewhat reflects definition	Largely reflects definition
Distress		
Eustress		

Figure 15. Matrix used for subject matter expert content validity review of the prospective ADES items.

The SMEs first carefully read the definitions of both distress and eustress. They were then instructed to read each prospective ADES item and place it in one of the cells of the content matrix (i.e. by classifying the item as reflecting distress or eustress and assessing how well the item reflects the definition of that construct). Items were retained on the basis of two criteria: 1) they were correctly classified by all reviewers; and 2) they were rated as 'largely reflecting the definition' by a minimum of 4 of 7 reviewers. Thirty-three items failed to meet Criteria 1, being rated by some of the SMEs as reflecting distress and by others as reflecting eustress. Forty-one items failed Criteria 2, being rated as 'largely reflecting the definition' by three or less SMEs. These items were consequently deleted from the pool, resulting in 104 potential eustress items and 122 potential distress items

### **6.1.1.3 Stage 3: Final review to combine items into a cohesive questionnaire**

Two major considerations were taken into account when combining the remaining items into a cohesive questionnaire: length and question order. Additionally the grammar and tense of items were modified to suitably conform to the pre-amble instructions.

#### **6.1.1.3.1 Questionnaire length**

It is generally assumed that questionnaire length is negatively related to response rate and quality of data (Galešić, 2002). This is considered to be especially evident in adolescents, who become more bored and easily distracted than adults (Zukerberg & Hess, 1996). However, all else being equal, DeVellis (2012) outlines that longer scales are always more reliable than those with less items. Furthermore, subscales consisting of less than five items with strong statistical factor loadings tend to be weaker and unstable (Costello & Osborne, 2005). Scale length must therefore optimally balance brevity with reliability (DeVellis, 2012). As such, the overall goal was for each ADES subscale to consist of five items, with a maximum total questionnaire length of 30 items (e.g. Costello & Osborne, 2005). However, as discussed in Section 5.2 (p. 144), having many items in the initial stages of questionnaire development is insurance against poor internal consistency and allows for greater discrimination in selecting items (DeVellis, 2012). Balancing these considerations, the choice was made for between 50 and 60 items be delivered to the development sample during the Evaluation stage (Chapter 7).

To select the items to be retained for evaluation, the remaining 226 items were subjected to a final SME review. Through a process of negotiation and agreement, the author and the supervisory team identified 60 items considered to maximise item quality and content validity. For balance, equal numbers of items were included in the distress and eustress subscales (Kern et al., 2016).

#### 6.1.1.3.2 *Item order*

Research suggests poor quality question order biases responses, while an optimum order motivates respondents (Dillman et al., 2014; Rattray & Jones, 2005). As such, established standards for scale item order were followed when combining items into a cohesive questionnaire (see Table 14).

Table 14

#### *Established Standards for Scale Item Order*

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Any item that may be controversial is placed at the end of the questionnaire (Dillman et al., 2014; Rattray & Jones, 2005).

The initial question should apply to everyone (to give a sense of relevance) and be easy to read, comprehend, and answer to reduce the perceived burden of the questionnaire (Dillman et al., 2014).

Questions are ordered logically (Dillman et al., 2014).

Question order effects should be monitored (Dillman et al., 2014).

---

#### **6.1.1.4 Conclusion**

At the conclusion of the SME review, 60 items from the draft pool were retained, shown in Table 15. These items, combined with the draft pre-amble instructions (see Section 5.1.2.3, p. 144) and item response options (see Section 5.3.1, p. 150), are henceforth known as the 'draft questionnaire'.



Table 15

*Prospective ADES Items Retained at the Conclusion of the Subject Matter Expert Review*

Eustress Subscale	Distress Subscale
1. I was eager to deal with the situation.	31. I couldn't help but think negatively.
2. I felt confident.	32. I had a negative attitude.
3. I felt confident that I could deal with the situation.	33. I had lots of negative thoughts.
4. I felt prepared to deal with the situation.	34. I felt overwhelmed.
5. I felt capable.	35. I didn't want to have to deal with the situation.
6. I felt I worked better under pressure.	36. I felt I was letting people down.
7. I felt I performed better under pressure.	37. I felt I let myself down.
8. I felt the situation was rewarding.	38. I was frustrated with myself.
9. I felt the outcome was worth the effort.	39. I felt like I couldn't control the situation.
10. I was focussed on achieving a goal.	40. I was in a bad mood.
11. I felt like I had achieved something.	41. I felt miserable.
12. I felt proud for dealing with the situation.	42. Most of my emotions were negative.
13. I know I tried my best.	43. I felt like crying.
14. I am content with how I dealt with the situation.	44. I behaved aggressively towards others.
15. I felt I had the skills I needed to deal with the situation.	45. I got into more arguments.
16. I believed in my ability to deal with the situation.	46. I felt frustrated.
17. I enjoyed being under pressure.	47. I got annoyed more easily.
18. I felt calm.	48. I was irritable.
19. I felt excited to deal with the situation.	49. I felt anxious.
20. Being under pressure was an adrenaline rush.	50. I felt panicked.
21. I concentrated on dealing with the situation.	51. I felt like vomiting.
22. I thought hard about the best way to deal with the situation.	52. I felt nauseous.
23. I tackled the situation one step at a time.	53. I felt exhausted.
24. I calmly searched for solutions to the situation.	54. My mind was racing out of control.
25. The pressure made me work harder.	55. I made mistakes more often.
26. I worked better under pressure.	56. I was uninterested in things I usually like.
27. I managed my time well.	57. I didn't want to talk to anyone.
28. I worked well under pressure.	58. I shut myself off from others
29. I felt determined.	59. I had so many problems I couldn't focus on anyone else's.
30. I felt motivated.	60. I took it out on others.

*Note.* Items numbered according to item order

## 6.2 Readability Review

Readability metrics are designed to formally assess the level of difficulty of reading and understanding a piece of text, based on the assumption that longer words and sentences are more difficult for a reader to comprehend (e.g. DeVellis, 2012; Jensen, Fabiano, Lopez-Williams, & Chacko, 2006). To examine readability of the draft questionnaire, the Flesch-Kincaid Grade Level Readability (FKGLR) score was utilised. This formula (Equation 2) takes into account word and sentence length to calculate the readability of a piece of text (Flesch, 1948; Kincaid, Fishburne, Rogers, & Chissom, 1975) and is intended for use on passages of text 100 words or more (Jensen et al., 2006).

$$Grade\ Level = 0.39 \left( \frac{Words}{Sentence} \right) + 11.8 \left( \frac{Syllables}{Word} \right) - 15.59 \quad (2)$$

The resulting FKGLR score corresponds to the minimum United States of America educational grade level an individual requires in order to be able to easily comprehend the text. For example, a score of 10.00 means the text is readable by the average individual in 10<sup>th</sup> grade and above. As with Australia, U.S. grade levels generally correspond to students' age (Table 16), meaning that scores can be translated into age recommendations. Taking the same example, a score of 10.00 suggests the text can be comprehended by the average reader aged 15 years and over.

Table 16

*Student Age at Each Grade Level in the United States of America (United States Department of Education, 2008)*

Grade	Age (years old)
1	6-7
2	7-8
3	8-9
4	9-10
5	10-11
6	11-12
7	12-13
8	13-14
9	14-15
10	15-16
11	16-17
12	17-18

Readability metrics should be considered with some key limitations in mind.

Chiefly, such formulae do not take into account the semantic and syntactic factors that may influence comprehensibility (DeVellis, 2012) and tend to be highly conservative underestimates of true readability of the text (Jensen et al., 2006). Despite these limitations, metrics such as the FKGLR score are currently considered to be the most accessible, efficient method for examining readability (Jensen et al., 2006).

There are no strict guidelines as to the desirable FKGLR score for adolescent questionnaires, with a review of common measures in child and adolescent clinical psychology indicating scales to range between 1.5 and 10.5 grade level (Jensen et al., 2006). As such, DeVellis (2012) outlines that scale developers must use common sense when applying readability statistics. It was thus reasoned that setting the maximum readability grade level well below the youngest anticipated respondent age would ensure

that the scale is easily read and understood by most intended. As such, the maximum FKGLR score for the ADES as a whole was set at 5, meaning the questionnaire should be readable by the average young person aged 10 years and over. Readability statistics were generated for the draft questionnaire utilising the in-built proofing systems in Microsoft Word (Microsoft, 2013). The FKGLR score for the draft questionnaire was calculated to be 3.9; as this was below the *a priori* set limit, no items were modified.

### 6.3 Cognitive Interview Review

A cognitive interview review, considered by some researchers to be a standard component of pre-testing (e.g. Bell, 2007; Dillman et al., 2014), involves examining, appraising, and questioning members of the intended respondent population while they complete a draft version of the questionnaire (de Leeuw et al., 2004). The goal of cognitive interviewing is to view the process of questionnaire completion through the eyes of the respondent (Drennan, 2002). Cognitive interviews can also be used to ensure items are culturally and developmentally appropriate, identify sensitive items, examine respondent fatigue, and evaluate whether the questionnaire can be appropriately navigated (e.g. Dillman et al., 2014; Drennan, 2002; Redmond et al., 2016). By understanding which items are problematic for respondents and why, items can be suitably modified before large scale distribution thereby improving the reliability and validity of the final questionnaire (de Leeuw et al., 2004; DeVellis, 2012; Drennan, 2002; Redmond et al., 2016).

Cognitive interviews draw on techniques from cognitive psychology to reveal respondents' underlying question-answer process and identify any issues or problems within this process. According to the Question-Answer Model, when responding to a

good quality questionnaire item, individuals go through five key cognitive stages, outlined in Table 17 (Bell, 2007; Conrad et al., 1999; Drennan, 2002).

Table 17

*The Five Stages of the Questionnaire Response Process Proposed by the Question-Answer Model (adapted from Bell (2007) and Dillman et al. (2014))*

Stage	Description of cognition
1 Perception	Respondent sees/hears the question. They decide what part of the page to focus on, recognise the navigational path, and discern where to start.
2 Comprehension	Respondent works to understand what is being asked. They determine what the question is asking, decide what the individual words mean, and figure out what the questionnaire is asking for. This involves coming to an understanding both of the terms used in the question and of task they are being asked to perform in order to answer it.
3 Retrieval	Respondent gathers relevant information by recalling information from memory and consulting relevant records/knowledgeable sources. If little is known, they think about related topics where more is known.
4 Judgement	Respondent formulates an answer by judging what retrieved information is relevant, whether some information is more important, and whether certain information should be omitted.
5 Response	Respondent reports an answer. They convert their answer into the required format, determine what units to report, and decide whether to edit the answer to be more socially desirable

When all question-answer stages are completed the respondent provides a high-quality, truthful answer; however, when one or more stages is neglected the respondent is said to employ a 'satisficing strategy' (Bell, 2007; Dillman et al., 2014). Satisficing consists of any strategy utilised to reduce the respondents' cognitive burden, such as

skipping questions or providing estimations rather than precise answers, and results in poor quality, potentially false answers (Bell, 2007; Dillman et al., 2014).

### **6.3.1 Cognitive Interview Techniques**

Cognitive interviewing is a qualitative approach involving semi-structured, in-depth interviews (Bell, 2007; de Leeuw et al., 2004; Drennan, 2002). There are three predominant cognitive interviewing techniques: think-aloud procedures, probing, and observation (described briefly below; for a more comprehensive discussion see Drennan, 2002).

#### **6.3.1.1 *Think-aloud procedures***

In a think-aloud procedure, participants are asked to give a complete verbal account of their thinking as they answer the questionnaire draft (e.g. Drennan, 2002) and encouraged to articulate what they think the question means, any words or concepts that are unclear, the process they are going through to retrieve information, and how they arrive at their chosen response (Bell, 2007). The verbalisation is considered as a representation of the question-answer process and to capture aspects of the respondent's memory, language, and comprehension in relation to the questionnaire (Drennan, 2002). While cognitive interview protocols vary, almost all versions use think-aloud techniques (Bell, 2007; Conrad et al., 1999).

#### **6.3.1.2 *Probing questions***

Probing questions are used in cognitive interviews to elicit additional information or explore unexpected responses (Drennan, 2002). During probing, researchers ask direct questions about how the respondent is going about answering the questions (Bell, 2007). Probes can ask for general or specific information and can be scripted, conditional (i.e. only asked if a particular condition arises), or spontaneous (Bell, 2007; Conrad et al.,

1999; Drennan, 2002). Common probes ask the respondent to paraphrase an item, define the meaning of a word, or identify an area causing difficulty (Drennan, 2002).

The use of direct probes in cognitive interviews is controversial within the literature. It is argued that probes may ask participants for information to which they do not have access, focussing their attention on aspects of the question-answer process that they would not normally have considered. This, in turn, is thought by some researchers to lead to invalid verbalisation or reports (e.g. Conrad et al., 1999). To minimise this limitation, it is suggested that probes aim only to amplify or clarify freely given verbalisations (Conrad et al., 1999).

#### **6.3.1.3 Behavioural observations**

During cognitive interviewing, the researcher may also note and record subjective observations of the participants behaviour (Drennan, 2002). Observations of interest include question skipping, flipping/scrolling back and forth when answering a question, changes in respondent appearance (e.g. frowning, hesitation, attention drop, fatigue), and putting answers in the wrong place (Drennan, 2002; Redmond et al., 2016). Observations can be followed up with direct probes questioning the difficulties being experienced (Drennan, 2002).

#### **6.3.2 Cognitive Interviews with Adolescents**

Cognitive interviewing is considered to be a suitable and successful method for use with adolescents, with the literature suggesting that young people are able to provide scale developers with valuable information (e.g. de Leeuw et al., 2004; Drennan, 2002; Zukerberg & Hess, 1996). However, qualitative evidence suggests that interviewing procedures need to be modified to suit the developmental needs of children and adolescents (Zukerberg & Hess, 1996). In particular, the think-aloud procedure has been found to cause problems for young people (de Leeuw et al., 2004; Zukerberg & Hess,

1996), with research suggesting that adolescents may lack the ability or motivation to articulate their thought processes (de Leeuw et al., 2004) and often find the procedure to be very embarrassing (Bell, 2007; Drennan, 2002; Zukerberg & Hess, 1996). Furthermore, adolescents can become bored and distracted by pauses, causing an issue for cognitive interviewing which uses pauses to encourage deep thinking (Zukerberg & Hess, 1996).

In light of these difficulties, it is suggested that cognitive interviews with adolescents should designate time at the start of the interview session to practice the think-aloud procedure (Dillman et al., 2014). Such practice allows the respondents to become comfortable with the procedure and helps to define the expectations of the interview (Dillman et al., 2014). Furthermore, it is recommended that think-aloud procedures be combined with other techniques, emphasising direct probes and observation of non-verbal communication (Bell, 2007; de Leeuw et al., 2004; Drennan, 2002; Zukerberg & Hess, 1996). As young people tend to have shorter attention spans than adults, consideration must also be given to drops in the participant attentiveness (de Leeuw et al., 2004). Finally, as with other qualitative interviews, time must be taken to build trust and rapport so as to make the experience more 'child friendly' (Redmond et al., 2016) and enhance the reliability of responses (Glozah, 2015).

### **6.3.3 The Current Cognitive Interview Review**

The overarching purpose of the current cognitive interview review was to identify which elements of the draft questionnaire were problematic for adolescent respondents and why. By understanding these problems, the aim was to suitably modify the questionnaire ahead of large-scale distribution, thereby improving the quality of the final scale. Interviews utilised a combination of the above described cognitive techniques with an appropriately modified procedure to suit the developmental needs of the adolescent participants.



### **6.3.3.1 Method**

#### *6.3.3.1.1 Participants*

In cognitive interviewing, members of the intended questionnaire population are used as informants. Ideally, participants are selected to match the characteristics of the proposed questionnaire sample. However, pragmatic concerns, namely postgraduate research timeline and the burden on participating schools, necessitated that the current sample be small and relatively convenient. As such, participants were recruited from The University of Adelaide and Pembroke School only<sup>16</sup>. Participants were required to be aged between 13 and 20 years and be fluent in English.

In light of the small, potentially ungeneralisable sample, effort was made to ensure that the sample included a wide range of potentially relevant cases (Pope & Mays, 2006). To this end, the maximum variation sampling was employed, such that the sample represented as many factors that may affect variability of experience as possible (Grbich, 1999). Participants were chosen based on a selection matrix of institution, age, gender, and academic achievement (Figure 16). The final sample consisted of 12 participants, see Table 18.

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<sup>16</sup> At the time of writing, data collection in public government schools required ethics clearance from both the University of Adelaide's internal Human Research Ethics Subcommittee and the South Australian Department for Education Research Unit. The extended time frame of Department of Education ethics applications prohibited BHS students from being involved in the cognitive interview review.

Institute	University								Private School															
Age	<del>13-14</del>				<del>15-17</del>				18-20				13-14				15-17				<del>18-20</del>			
Gender	<del>M</del>		<del>F</del>		<del>M</del>		<del>F</del>		M	F	M	F	M	F	M	F	<del>M</del>	<del>F</del>	<del>M</del>	<del>F</del>	<del>M</del>	<del>F</del>		
Achievement	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L		
	1	2	3	4	5	6	7	8	9	10	11	12												

Figure 16. Selection matrix used for maximum variation sampling for cognitive interview review of prospective ADES items. Crossed-out cells indicate impossible combinations. H: Higher academic achiever, L: Lower academic achiever.

Table 18

*Description of Participants for Cognitive Interview Review of the ADES*

Participant Number	Institute	Gender	Age <sup>a</sup>
P1	University	F	19
P2	University	M	19
P3	University	M	19
P4	School	F	15
P5	School	F	13
P6	School	F	15
P7	School	M	15
P8	School	M	15
P9	University	F	18
P10	School	F	13
P11	School	M	13
P12	School	M	13

<sup>a</sup>Age in years at the time of the Interview (March-April 2017)

*Note.* As an ethical requirement, the authors did not have access to participants' academic achievement. Educational leaders at the respective institutions were made aware of the sampling matrix and selected suitable participants from an initial pool of volunteers.

#### *6.3.3.1.2 Ethical considerations*

The ethical principles for the current cognitive interviews were equivalent to those of Paper 1 (see Section 4.3.3.3, p. 117), and considered informed participant and parental consent, safeguarding participant emotional wellbeing, anonymity during analysis and reporting of data, and a mandatory notification protocol. This section of the review was approved by the University of Adelaide School of Psychology: Human Research Ethics Subcommittee (Code Number: 17/10).

#### *6.3.3.1.3 Data collection*

Semi-structured interviews of approximately 40 minutes duration (range 21:26-50:43) were conducted. Each interview followed a broad guide, containing four distinct sections (see Table 19 for a description of these sections and Appendix C for a copy of the guide). All interviews were audio recorded and notes kept as to pertinent behavioural observations.

Table 19

*A Description of Each of the Four Sections of the Cognitive Interview Guide*

Interview Section	Description
1 Introduction and consent gaining	Information about the project and ethical considerations. Rapport building.
2 Explanation	Explanation of the purpose of a cognitive interview. Discussion of the expectations of the interview. Question to practice the think-aloud procedure.
3 Draft Questionnaire Completion	Participant asked to complete draft questionnaire - a combination of the think-aloud, probing, and observation techniques used to elicit a complete description of participants cognitive processes while answering items.
4 Closing statements	Wrapping up the interview. Final thoughts and closing statements.

*6.3.3.1.4 Analysis method*

Analysis of cognitive interviews involves coding the content of problems identified through respondents' verbal responses and behavioural observations (Conrad et al., 1999). As with other qualitative methods, analysis of this type has been criticised for being subjective (Drennan, 2002). In the absence of an explicit framework to analyse and interpret cognitive interviews, Conrad et al. (1999) developed a taxonomy of questionnaire problems (Table 20). It is argued that coding interviews against this taxonomy increases the objectivity and consistency of analysis (Drennan, 2002).

Table 20

*Conrad et al.'s (1999) Taxonomy of Problems Revealed via Cognitive Interviews*

Problem Category	Description
Lexical	Problems with respondent understanding, comprehension.
Inclusion/Exclusion	Problems regarding the respondents' determination of the scope of the question i.e. what information should be included or excluded.
Temporal	Problems related to the respondents understanding of the time frame to which the question refers.
Logical	Problems related to the logical connectors (e.g. 'and', 'other than') and presuppositions used in items.
Computational	Any other problem e.g. memory recall problems.

For the current investigation, interview recordings and observational notes were thoroughly examined and coded against Conrad et al.'s (1999) taxonomy of problems. Based on the identification of problems, items were either discarded or suitably reworded with consultation from the supervisory team. However, Conrad et al. (1999) note that in using this framework, the identification of a problem does not guarantee the identification of a suitable solution.

### **6.3.3.2 Findings**

Overall, participants characterised the questionnaire as easily understood and developmentally acceptable. However, a number of lexical, inclusion/exclusion, temporal, logical, and computational problems were identified. The analysis below describes the problems identified with the questionnaire overall, with the pre-amble instructions, and with individual items and outlines the actions taken to resolve these issues.

#### 6.3.3.2.1 *Problems identified with the draft questionnaire overall*

The major issue associated with the draft questionnaire was that it was overly long and repetitive. Participants reported this excess length encouraged frivolous and careless answers (P1, P4, and P12), made the questionnaire more confusing (P3), and “*annoyed*” participants (P1 and P4). In response to this feedback, the decision was made to reduce maximum the number of questionnaire items from 60 to 50 before delivering to the development sample for psychometric evaluation. The choice of which items to discard was made based on careful consideration of both the feedback given by participants and on the theoretical and pragmatic recommendations of the supervisory team (SMEs), outlined in Section 6.3.3.2.3 (p. 174) below.

Concerns about social desirability bias were identified by participants as a secondary concern with the questionnaire as a whole. Participants characterised stress as a socially sensitive subject, suggesting that respondents may answer questions falsely in order to present themselves in the best light. This was particularly true of certain items regarding behaviours deemed to be socially improper (e.g. behaving aggressively towards others). This bias was further considered by some to be particularly pertinent for boys, for whom expressing emotions was constructed as particularly socially undesirable (P6, P7, and P10). This issue was also expected by participants to be heightened if respondents did not feel that their answers were private, such as if they were taking the questionnaire in a classroom situation. The issue of social desirability was subsequently dealt with statistically during the Evaluation stage (see Section 7.2.4.1, p. 206); however, particular items identified by cognitive interview participants as potentially ‘threatening’ were considered for deletion at this stage.

#### 6.3.3.2.2 *Problems identified with the pre-ample instructions*

The major issue encountered with the drafted instructions (described in Section 5.1.2.3, p. 144) was a perceived disconnect between the pre-ample and the items, with participants confused as to why many items referred to ‘the situation’ when no situation was mentioned in the pre-ample. This lexical problem was observed to cause misinterpretation of the questionnaire items, and as such three potential solutions were considered:

1. Re-writing the pre-ample to ask participants to ‘Please think about all the situations that have put you under pressure in the last 7 days. For each item below, choose the answer the best describes how you responded to these pressure situations’.
2. Rewording all items to remove reference to the situation, instead referring to ‘dealing with the pressure’ or ‘facing the pressure’.
3. Changing the phrase ‘the situation’ to ‘the pressure situations’.

In determining which option to move forward with, two key criteria were considered.

Firstly, that the solution follow the evidence-based guidelines for item creation described in Section 5.2.1 (p. 146), such that any change needed to use simple and clear language, avoid negatively-phrased questions, mitigate social desirability, and enhance variability.

Secondly, as one-third of cognitive interview participants either skimmed or failed to read the instructions (P4, P7, P9, and P12), the choice was made that each question be self-contained, such that it could be understood even by participants who do not read the pre-ample. Considering the above proposed solutions, Solution 1 was dismissed because re-writing the pre-ample in this way did not allow each item to be self-contained. Solution 3 was dismissed because the phrase ‘pressure situations’ was considered to be an overly confusing, unfamiliar wording. Solution 2 was therefore

considered the best option and the 14 items containing the phrase ‘the situation’ (Items 1, 3, 4, 8, 12, 14, 15, 16, 19, 21, 22, 23, 35, and 39) were reworded to refer instead to ‘the pressure’.

A further issue identified during the cognitive review was that all participants, at least once during the completion of the questionnaire, answered items based on how they usually respond to pressure and not on how they specifically responded in the last seven days. Critically reflecting on the reasons for this temporal issue, participants suggested this issue was related to an under-emphasis on the questionnaire time frame in the pre-ample, leading them to answer based on their general disposition, not on recent experience. It was therefore expected that emphasising the time frame in the pre-ample would help to resolve this problem. Therefore, the pre-ample was edited such that ‘in the last 7 days’ was written in bold and placed immediately before the items so as to be more conspicuous and visually obvious, as follows:

*These questions are about **how you respond to pressure**.*

*Everybody responds to pressure differently at different times. Pressure can be good for you, bad for you, or a bit of both.*

*For each item below, please choose the answer that best describes how you responded to pressure **in the last 7 days**.*

#### 6.3.3.2.3 Problems identified with individual items

Problems associated with each of the 60 draft scale items were individually coded against Conrad et al.’s (1999) Taxonomy of Problems. Overall, only items 17 (*I enjoyed being under pressure*), 29 (*I felt determined*), 30 (*I felt motivated*), 32 (*I had a negative attitude*), and 46 (*I felt frustrated*) were found to have no associated lexical, inclusion/exclusion, temporal, or logical problems. The remaining 55 draft scale items were all identified to have various degrees of lexical, inclusion/exclusion, temporal,



logical, and computational issues. Detailed analysis for each item is summarised in Appendix F, outlining the problems experienced by participants and the solutions identified for each item.

#### *6.3.3.2.4 Problems identified with item order*

The draft questionnaire was ordered such that all eustress subscale items were presented first, followed by the distress subscale items. P4, P6, and P8 identified this order as problematic, suggesting that there was a big shift in tone from the eustress to distress items, making response options more difficult to parse. Further, P2 identified that the item's order affected his subsequent responses. Considering this feedback, the choice was made to intersperse eustress and distress items, rather than presenting them as two distinct groups. Keeping in mind the established standards for item order described in Section 6.1.1.3.2 (p. 158), the following changes were made:

- *“I felt I worked better under pressure”* was chosen as the first item as it was considered salient to all participants and caused no lexical, inclusion/exclusion, temporal, logical, or computational problems.
- Items *“I felt I was letting people down”* and *“I took it out on others”* were placed near the end of the scale as participants identified these items as potentially personal and controversial.
- The remaining items were randomly ordered using a random number generator.

#### **6.3.3.3 Limitations of the current cognitive interview review**

Modifying a questionnaire based on a cognitive interview review necessarily assumes that the problems identified by participants apply to all intended respondents. Two key limitations that must be kept in mind when appraising the appropriateness of this assumption. Firstly, the cognitive interviews presented participants with an

environment and set of tasks that would not be present during actual questionnaire completion (Drennan, 2002). The presence of the interviewer, the requirement to think aloud, and the types of probes asked may all have altered the way in which the draft questionnaire was completed (Conrad et al., 1999; Drennan, 2002). Indeed, 25% of current participants expressed that the process of thinking aloud affected how they answered the questions and the response options they chose. As such, the problems identified may only reflect artefacts of the artificial environment. Secondly, as cognitive interviews are time consuming, labour intensive, and burdensome for both researcher and respondent (Dillman et al., 2014; Drennan, 2002), the number and type of participants were necessarily restricted. As such, the problems identified with the questionnaire may reflect specific characteristics of this small, particular group of participants rather than reflecting a generalisable problems that will affect the larger and more diverse intended population (Dillman et al., 2014).

To combat these limitations steps were taken to ensure that the current methodology and analysis was rigorous, objective, and consistent. Maximum variation sampling enhanced the transferability of the results, meaning that the problems identified in this small sample are likely transferable to similar contexts (see Section 4.3.5.1, p. 135, for a more detailed discussion of transferability; Pope & Mays, 2006). Further, throughout the process of analysis and item modification there was ongoing consultation and agreement amongst the supervisory team. However, as cautioned by Dillman et al. (2014), there is no guarantee that modifications to items on the basis of cognitive interviews will not create different problems for other respondents.

#### **6.3.3.4 Conclusion**

At the conclusion of the cognitive interview review the questionnaire pre-ambles was altered, the order of items was adjusted, and only 50 of the original 60 items were

retained. The amended questionnaire, referred to as the Preliminary ADES, is presented in full on the following two pages (pp. 178 - 179). To ensure readability of the reviewed scale was still below the *a priori* limit, the FKGLR score was re-calculated and found to be 3.5, meeting the readability criteria set out in Section 6.2 (p. 160) of FKGLR < 5.

### The Preliminary Adolescent Distress-Eustress Scale

These questions are about **how you respond to pressure**.

Everybody responds to pressure differently at different times. Pressure can be good for you, bad for you, or a bit of both.

For each item below, please choose the answer that best describes how you responded to pressure **in the last 7 days**.

		Not like me		Some- what like me		Very much like me
E.a	I felt I worked better under pressure.	0	1	2	3	4
D.a	I felt exhausted.	0	1	2	3	4
D.b	I shut myself off from others	0	1	2	3	4
E.b	I felt confident that I could deal with the pressure.	0	1	2	3	4
D.c	I was in a bad mood.	0	1	2	3	4
E.c	I managed my time well.	0	1	2	3	4
E.d	I was focussed on achieving a goal.	0	1	2	3	4
D.d	The situation putting me under pressure was out of my control.	0	1	2	3	4
D.e	I felt anxious.	0	1	2	3	4
E.e	I know I tried my best.	0	1	2	3	4
D.f	I felt miserable.	0	1	2	3	4
E.f	I felt capable.	0	1	2	3	4
D.g	I felt overwhelmed.	0	1	2	3	4
E.g	I felt excited to face the pressure.	0	1	2	3	4
E.h	I felt I had the skills I needed to deal with the pressure.	0	1	2	3	4
D.h	I felt frustrated.	0	1	2	3	4
D.i	I felt like crying.	0	1	2	3	4
D.j	I made mistakes more often.	0	1	2	3	4
E.i	I felt like I had achieved something.	0	1	2	3	4
D.k	I felt panicked.	0	1	2	3	4
E.j	I dealt with the pressure one step at a time.	0	1	2	3	4
E.k	I believed in my ability to deal with the pressure.	0	1	2	3	4

D.l	I got into more arguments.	0	1	2	3	4
E.l	I was focussed on dealing with the pressure.	0	1	2	3	4
E.m	I felt the outcome was worth the effort.	0	1	2	3	4
D.m	I felt I let myself down.	0	1	2	3	4
E.n	I felt determined.	0	1	2	3	4
D.n	I didn't want to talk to anyone.	0	1	2	3	4
D.o	I got annoyed more easily.	0	1	2	3	4
D.p	I had a negative attitude.	0	1	2	3	4
E.o	Being under pressure was a rewarding experience.	0	1	2	3	4
E.p	I felt proud for dealing with the pressure.	0	1	2	3	4
D.q	I had so many problems I couldn't focus on anyone else's.	0	1	2	3	4
E.q	The pressure made me work harder.	0	1	2	3	4
D.r	I was frustrated with myself.	0	1	2	3	4
D.s	I had lots of negative thoughts.	0	1	2	3	4
E.r	I felt prepared to deal with the pressure.	0	1	2	3	4
E.s	I felt calm.	0	1	2	3	4
E.t	I felt motivated.	0	1	2	3	4
E.u	I was eager to deal with the pressure.	0	1	2	3	4
E.v	I thought hard about the best way to deal with the pressure.	0	1	2	3	4
D.t	I felt nauseous.	0	1	2	3	4
E.w	I felt I performed better under pressure.	0	1	2	3	4
D.u	I was uninterested in things I usually like.	0	1	2	3	4
D.v	My mind was racing out of control.	0	1	2	3	4
E.x	I was satisfied with how I dealt with the pressure.	0	1	2	3	4
E.y	I enjoyed being under pressure.	0	1	2	3	4
D.w	I wanted to avoid dealing with the pressure.	0	1	2	3	4
D.x	I felt I was letting people down.	0	1	2	3	4
D.y	I took it out on others.	0	1	2	3	4

## 6.4 Summary

Through a thorough pre-testing process, summarised in Figure 17, the initial pool of 463 candidate ADES items was refined, improved, and combined to form a cohesive, 50-item preliminary scale ready for delivery to a development sample for psychometric evaluation.

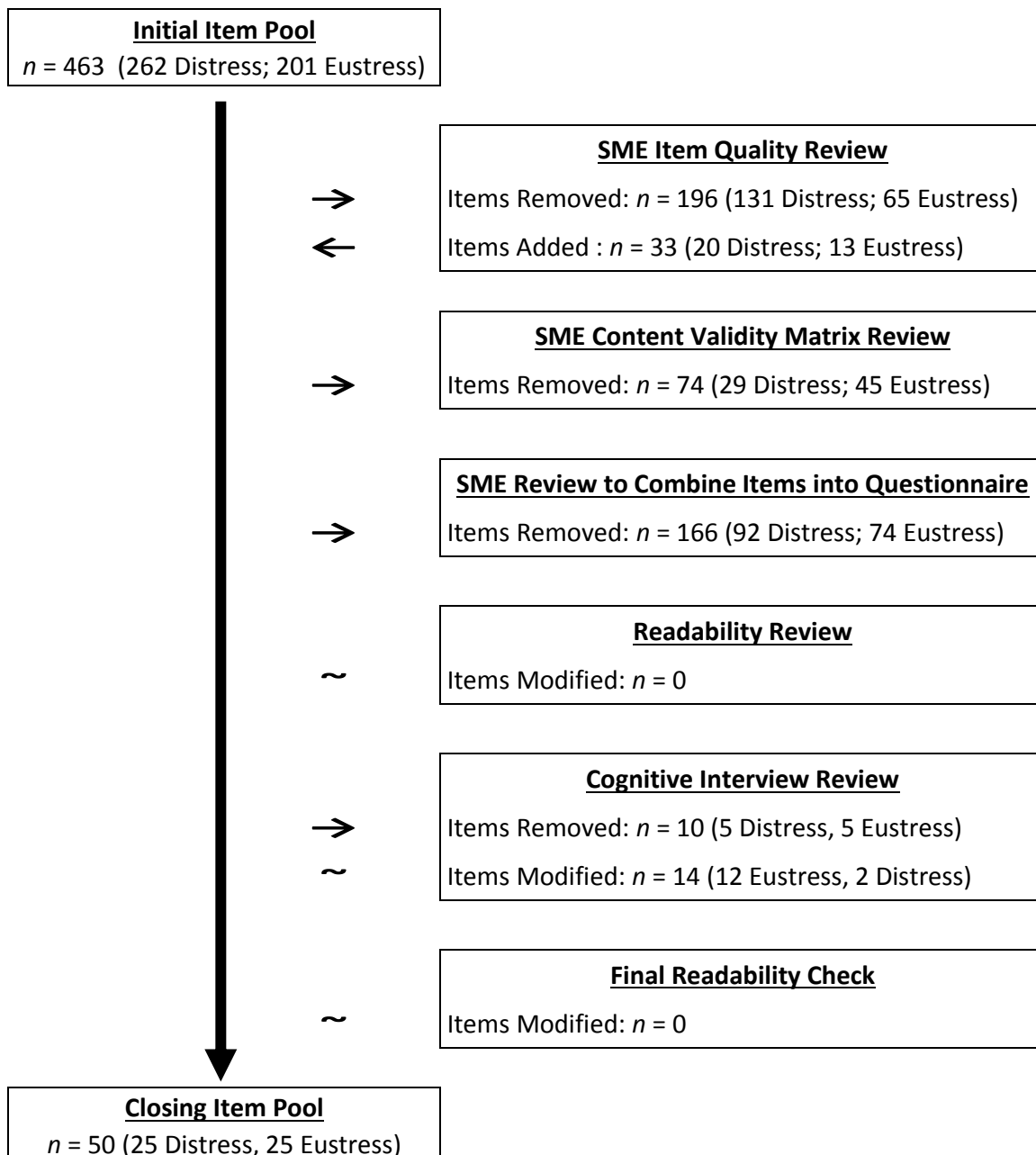


Figure 17. A summary of the ADES review process.

## CHAPTER 7. EVALUATION OF THE ADOLESCENT DISTRESS-EUSTRESS SCALE

At the conclusion of the evidence-informed creation and review processes outlined in the previous two chapters, results from the initial literature review and qualitative investigations were translated into the 50-item Preliminary ADES. The next stage in scale development was to optimise and thoroughly evaluate the psychometric properties of this preliminary measure, addressing Steps 5-8 of DeVellis' (2012) scale development framework (see Section 2.3.2, p. 57).

Chapter 7 presents the results from a large-scale empirical study undertaken to optimise and evaluate the ADES (Paper 2). In the first section of the chapter, the analytic methodology utilised in evaluating the ADES is justified, expanding upon the description included in the published paper. The characteristics of the development sample and the resultant statistical power of the study are also described. Next, Paper 2 is presented as published in the journal *SAGE Open*. The final section of Chapter 7 outlines additional evaluation of the ADES conducted after the completion of Paper 2, which aimed to address the limitations of the initial evaluation study.

### 7.1 Methodology: Paper 2

Paper 2 focussed on two main analytical goals: 1) *optimising* the ADES from the preliminary collection of items and 2) *testing* the psychometric properties of the resultant scale. Both of these aims address the core goal of producing a brief, psychometrically-sound measure of adolescent stress.

#### 7.1.1 Measure Optimisation

The first aim of Paper 2 was to optimise the Preliminary ADES, producing a scale with evenly balanced subscales of approximately five items (see Section 6.1.1.3.1, p. 157; Costello & Osborne, 2005; Galešić, 2002). As recommended by DeVellis (2012), a 'split-

samples procedure' was used to optimise the ADES, wherein the total development sample was divided randomly into two subsamples of approximately equal size: the 'Development Subsample' and the 'Cross-checking Subsample'<sup>17</sup>. Item selection was first conducted in the Development Subsample and the measure appropriately optimised, then the Cross-checking Subsample was used to substantiate and support these results. This replication process aimed to ensure the structure of the optimised ADES was not the result of a quirk of the sample, enhancing the stability and soundness of the scale (Cicero, Neis, Klaunig, & Trask, 2016; DeVellis, 2012).

The preliminary ADES was optimised in the Development Subsample in two steps. First, the preliminary item pool was screened for deficient psychometric properties by examining inter-item correlations, item distributions, and the effect social desirability on individual items (Churchill, 1979; DeVellis, 2012). The remaining items were then subjected to exploratory factor analysis (EFA) to reduce the total scale length to approximately 10 psychometrically sound items. To substantiate and replicate these development results, confirmatory factor analysis (CFA) was then conducted in the Cross-checking Subsample. The analytic methodology for each of these optimisation procedures are outlined in the main Paper (Section 7.2.3, pages 200 - 211). However, psychometric literature outlines that the procedure for factor analysis must be systematic and predefined in order to reduce bias (e.g. Rattray & Jones, 2005) and as such key factor analytic decisions are justified below.

#### **7.1.1.1 Factor analysis**

Factor analysis examines how scale items co-vary to determine how strongly they are related to (or 'load' on) the underlying latent variable (DeVellis, 2012). In the

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<sup>17</sup> The MatLab (MathWorks, 2017) computer program was used to create a split that balanced demographic characteristics across samples (gender, age, CALD, educational institution).



optimising the Preliminary ADES, two types of factor analysis were utilised: EFA and CFA.

Broadly, EFA can be conceptualised as theory-generating, while CFA is theory-testing (e.g. Costello & Osborne, 2005; Rodríguez et al., 2013)

#### *7.1.1.1.1 Exploratory factor analysis in the Development Subsample*

EFA identifies which questionnaire items cluster together statistically and form factors (e.g. Huppert, Walters, Day, & Elliott, 1989). In optimising the ADES, a series of EFAs were conducted in the Development Subsample to identify items with deficiently low factor loadings for deletion (Corr & Cooper, 2016; DeVellis, 2012). A total of 20 iterative EFAs were conducted, whereby items with the lowest loadings were deleted in sequence until all items had substantial, meaningful loadings on only one factor<sup>18</sup>.

Overall, the EFA procedure in Paper 2 was conducted according to best practice as presented in Costello and Osborne (2005). Following these recommendations, EFA was used over Principal Component Analysis, another common method dimensionality reduction, as the latter does not discriminate between shared and unique variance. Further, as distress and eustress represent contrasting responses to environmental stressors and should thus be negatively correlated, an oblique factor rotation method<sup>19</sup> (direct oblim,  $\Delta = 0$ ), was used to analyse the data.

Factors were primarily retained on the basis of a parallel analysis examining critical value eigenvalues generated for multiple randomly generated data sets. Additional consideration was also given to subjective criterion (i.e. scree test) and

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<sup>18</sup> This procedure resulted in a suitably parsimonious scale consisting of 10 items. However, if this procedure resulted in more than 5 items per subscale, the pre-defined analysis plan outlined the item pool be further distilled based on item-to-total correlations.

<sup>19</sup> Factor rotation maximises the loadings of items on one factor and minimises those with a weaker one, increasing the interpretability of the factors (DeVellis, 2006, 2012; Rattray & Jones, 2005). Uncorrelated factor are 'orthogonal' and correlated factors 'oblique' (Costello & Osborne, 2005; DeVellis, 2012; Rattray & Jones, 2005).

relevant theory about the latent variables (e.g. Costello & Osborne, 2005; DeVellis, 2012). Beyond statistical EFA criteria, theoretical interpretability of the remaining items was also considered (DeVellis, 2012). For example, of the final six distress subscale items with the strongest factor loadings, two were very similar in wording: Item D.h: “I felt frustrated” and Item D.r: “I felt frustrated with myself”. While these items both had factor loadings greater than Item D.v: “My mind was racing out of control”, it was considered that including both of these items would be overly repetitious and confusing. As such, two further EFAs were run, comparing the impact of each item’s deletion. Removing Item D.h maximised factor loadings and as such Item D.r retained.

#### *7.1.1.1.2 Confirmatory factor analysis in the Cross-checking Subsample*

CFA uses statistical modelling to evaluate how well the theorised model of factor structure fits with the observed sample data (Burnett & Fanshawe, 1997; Cheung & Rensvold, 2002; Schreiber, 2008). In Paper 2, CFA was used in the Cross-checking Subsample to add additional weight to the EFA results (Churchill, 1979).

Model fit is commonly assessed in CFA using the Chi-square goodness of fit statistic, wherein adequate fit is indicated by a non-significant  $\chi^2$  statistic (Cheung & Rensvold, 2002). However, this statistic is extremely sensitive to sample sizes, meaning that it is not a practical test of model fit in larger samples (Cheung & Rensvold, 2002). In light of this, many fit indices have been proposed as alternatives to the  $\chi^2$  statistic (Cheung & Rensvold, 2002; Hu & Bentler, 1999). These indices do not have sampling distributions, so various criterion values have been proposed to indicate adequate fit (Cheung & Rensvold, 2002). Based on the recommendations of Schreiber (2008) and Hu and Bentler (1999) the following criteria were used to indicate adequate model fit: root mean squared error approximation (RMSEA)  $\leq 0.08$ , comparative fit index (CFI)  $\geq 0.95$ , and Tucker-Lewis Index (TLI)  $\geq 0.95$ .

### **7.1.1.2 Item order**

Subsequent to optimisation, 10 items were retained in the final ADES. These items were reordered according to the guidelines laid out in Section 6.1.1.3.2 (p. 158). ‘I felt motivated’ was chosen as the first item as it was considered to be salient to all participants and caused no lexical, inclusion/exclusion, temporal, logical, or computational problems in the cognitive interviews (see Section 6.3.3, p. 166). ‘I was frustrated with myself’ was placed at the end of the scale as this item was identified as having the possibility of being construed as personal and/or controversial. The remaining items were then randomly ordered using a random number generator.

## **7.1.2 Measure Testing**

### **7.1.2.1 Reliability**

In testing the ADES, two types of reliability were considered: internal and test-retest.

#### **7.1.2.1.1 Internal reliability**

Internal reliability refers to the homogeneity of items within the scale; a scale is internally reliable to the extent that the inter-item correlations are high (DeVellis, 2006, 2012; Rattray & Jones, 2005). There are many methods of computing internal reliability, with each having utility in different situations (see DeVellis, 2012 for a summary). In Paper 2, Cronbach’s coefficient alpha ( $\alpha$ ), defined as “the proportion of variance in a set of scores that can be attributed to a common influence on the scores of the individual items” (DeVellis, 2006, p. 52), was calculated as it is the most commonly used metric in psychological research. There is no consensus on the acceptable bounds of Cronbach’s  $\alpha$ , with researchers using varying cut offs. Rattray and Jones (2005) argue that a new scale should have a minimum Cronbach’s  $\alpha$  of 0.7, although applied literature suggests this should be stricter if the scale is to be used in a clinical or diagnostic setting (Churchill,

1979; DeVellis, 2012). Beyond these minima, DeVellis (2012) suggests that a scale's reliability can be considered 'respectable' between Cronbach's  $\alpha = 0.7 - 0.8$  and 'very good' between Cronbach's  $\alpha = 0.8 - 0.9$ .

#### *7.1.2.1.2 Test-retest reliability*

Test-retest reliability refers to the stability of a measure across time (Cronbach & Meehl, 1955; DeVellis, 2006, 2012; Rattray & Jones, 2005). If a measure has poor temporal stability one cannot determine if changes in scores across time are meaningful or due to measurement error. It is therefore crucial to establish the test-retest reliability of scales used to assess individuals at multiple time points, such as in intervention settings (Compas, 1987b; DeVellis, 2006; Rattray & Jones, 2005). Test-retest reliability is assessed by correlating the scores obtained on a measure across two administrations to the same respondents. Higher cross-time correlations indicate greater test-retest reliability (DeVellis, 2012), with correlation coefficients exceeding 0.7 considered to indicate 'useful' temporal stability, and those greater than 0.8 indicating 'good' temporal stability (Byrne et al., 2007; De Vriendt et al., 2011; Suldo et al., 2015a).

As the ADES is a quasi-state measure it likely to vary across relatively short time frames (see Section 5.1.2.1, p. 141). The retest interval was therefore chosen to be brief, with a maximum lag of seven days (Byrne et al., 2007; S. Cohen et al., 1983). However, calculation of temporal stability of the ADES is likely limited as evidence suggests negatively stressful events are better remembered than neutral ones (Meir Drexler & Wolf, 2017), meaning the distress subscale may be expected to have artificially higher test-retest reliability estimated.

#### **7.1.2.2 Validity**

Psychometric literature suggests there are three main types of validity relevant for scale development:

1. Content validity: the extent to which the scale's items accurately reflect the content domain;
2. Criterion-related validity: the extent to which the scale is empirically associated with some relevant criterion measure (sometimes referred to as predictive validity); and
3. Construct validity, the extent to which the scale is suitably associated with theoretically related variables in its nomological network (Cronbach & Meehl, 1955; DeVellis, 2012).

The content validity of the ADES was established through the rigorous process of developing and refining the items described in the previous four chapters (DeVellis, 2012; Sterba et al., 2007). Criterion validity was addressed in Paper 3, by examining the extent to which the ADES predicted scores on conceptually-related wellbeing measures (see Chapter 8). Construct validity was addressed in Paper 2 by examining if the ADES a) was associated with other measures designed to measure the same thing (convergent validity); and b) related as expected with other measures of non-stress constructs (discriminant validity; Churchill, 1979). The literature recommends these associations be quantified using validity coefficients, which are calculated as the correlation between the two measures (Churchill, 1979; DeVellis, 2012; Rattray & Jones, 2005)<sup>20</sup>.

Step 5 of DeVellis's (2012) scale development framework sets out that prior to delivering candidate items to the development sample, the theoretical nomological network of the phenomena of interest should be considered to identify appropriate validation constructs (see Section 2.3.2, p. 57). The main paper provides a brief

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<sup>20</sup> While some researchers argue that correlations should be 'corrected' to take into account the reliability of the measures, others argue this overestimates the true association (DeVellis, 2012). As such, correlation coefficients were not adjusted in Paper 2.

justification for the choice of these constructs, with this consideration expanded on below.

#### *7.1.2.2.1 Convergent validity*

Evidence for the convergent validity of the ADES was provided in Paper 2 by examining the extent to which the distress and eustress subscales were correlated with established stress measures. The Academic Eustress Scale (AES; O'Sullivan, 2011) and the 10-item Perceived Stress Scale (PSS-10; S. Cohen et al., 1983; S. Cohen & Williamson, 1988) were selected for use on the basis that their conceptualisation of positive and negative 'stress' respectively were the closest analogue of the ADES subscales. As described in Section 1.3.1.2.2 (p. 31), the AES has several notable shortcomings, however as the only scale located in the literature to measure the positive aspects of the stress response in young people, it was the only viable option to examine the convergent validity of the ADES's eustress subscale. The PSS-10, on the other hand, has robust psychometric properties in both adult and adolescent samples.

Convergent validity coefficients ideally indicate a strong positive relationship between the measures, but should not exceed the square root of the reliability coefficient Cronbach's  $\alpha$ . In Classical Test Theory  $\sqrt{\alpha}$  is considered to be equal to the scale's correlation with the true score, and as no other indicator should be a better estimate of the true score than the true score itself, no validity coefficient should exceed  $\sqrt{\alpha}$  (DeVellis, 2006).

#### *7.1.2.2.2 Discriminant validity*

Evidence for the discriminant validity of the ADES was provided by examining the extent to which the scale was theoretically distinct from similar constructs. As there are no specific contemporary guidelines regarding the threshold for discriminant validity (DeVellis, 2012), the traditional Campbell and Fiske (1959) cut-off was utilised, whereby a

correlation less than 0.8 is considered to be evidence of discriminant validity. The related, non-stress constructs selected to examine discriminant validity in Paper 2 were: self-efficacy, sense of coherence, and the Five Factor Model of personality<sup>21</sup>. These constructs were selected on the basis of four criteria:

1. Shared conceptual and theoretical overlap and/or empirical links to distress/eustress;
2. Unrelated to psychological wellbeing outcomes (in Paper 3, the ADES was used to investigate the relationship between stress response and wellbeing, as such inclusion of psychological wellbeing markers as validation items would constitute a tautology (Compas, 1987b));
3. The construct was reflected in the qualitative results found in Paper 1; and,
4. Availability of a measure that has robust psychometric properties in adolescent samples and is pragmatically suitable (e.g. length, cost).

Further validation evidence was provided by examining the extent to which the ADES related as expected to these constructs. The theoretical and empirical rationale for the expected pattern of relationships is succinctly summarised in Paper 2 (see Section 7.2.3.4.2.2, p. 208) and expanded on in Appendix G.

Given the pragmatic restrictions of the project, such as respondent time burden and attention span and constraints of working within the school timetable, it was implausible to examine all possible discriminant validation constructs. Those described above were chosen as they best meet the four selection criteria and combined to form a questionnaire of suitable length (estimated completion time 45 minutes). However, reviewing the literature suggested the following alternative validation constructs: self-

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<sup>21</sup> The Five Factor Model of Personality defines Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism as the Big 5 personality traits (e.g. McCrae & Costa, 1997)

esteem (Byrne et al., 2007; Mullis et al., 1993; O'Sullivan, 2011); coping (Hargrove et al., 2014); locus of control (Nelson & Simmons, 2003; Peacock & Wong, 1990); self-reliance (Nelson & Simmons, 2003); physiological symptomology (Peacock & Wong, 1990; Rodríguez et al., 2013); and cognitive appraisal of stressor (Peacock & Wong, 1990). As validation is an ongoing, cumulative effort (DeVellis, 2012), these constructs could be used in future studies seeking to further validate the ADES.

#### *7.1.2.2.3 Measurement invariance*

In addition to examining the relationships between the ADES and conceptually related constructs, the validity of the scale was established through investigation of measurement invariance i.e. the extent to which a scale performs equivalently across different groups of respondents. Specifically, invariance across gender groups was considered given extant literature suggests adolescent females are exposed to more stressors and experience greater emotional reactivity to these demands (e.g. Almeida & Kessler, 1998; Flook, 2011; Kiang & Buchanan, 2014; see for further Section 8.3.2.1.3, p. 272). Analytically, measurement invariance is investigated using Multigroup Confirmatory Factor Analysis (MCFA), which examines the change in the CFA fit indices when cross-group constraints are progressively imposed on the measurement model (Brown, 2015; Cheung & Rensvold, 2002). Different terminology is used across the literature, but broadly the models from least to most strict are:

- Configural invariance: The pattern form is constrained across groups, such that the number of factors and pattern of indicator-factor loadings are equal.
- Metric invariance: Factor loadings constrained to be equal across groups.
- Scalar invariance: Indicator intercepts constrained to be equal across groups.
- Variance-Covariance Invariance: Unique variances and covariances (if considering an oblique model) constrained to be equal across groups.



- Strict invariance: Indicator residuals constrained to be equal across groups.

Three models were compared in evaluating the ADES: configural, metric, variance-covariance (Vandenberg & Lance, 2000). Scalar variance, argued by some researchers (e.g. Brown, 2015) to be integral when interpreting group differences, was not considered. This is because previous literature has argued that if a measure is assumed to be a valid operationalisation and that there are true differences between groups in the construct, then the items underlying the measure should also reflect these differences (Vandenberg & Lance, 2000). In this case, differences on item intercepts would be fully expected and the scalar constraint was therefore considered to be inapplicable.

### **7.1.3 Paper 2 Sample**

Attempts were made to avoid restrictive sampling by considering both the size and the composition of the evaluation sample (S. Cohen et al., 1983; DeVellis, 2012). A total of 1,147 students from BHS, Pembroke School, and the University of Adelaide took part in the study, with 981 providing useable data; the listwise sample size was 876.

#### **7.1.3.1 Sample size and power analysis**

Factor analysis requires substantially large samples, however, there is no consensus as to the specific size requirements (Costello & Osborne, 2005; DeVellis, 2006). Common rules of thumb recommend 5-10 respondents per scale item, provided variable distributions are normal (Schreiber, 2008), with a minimum of 300 respondents (Costello & Osborne, 2005; DeVellis, 2012; Rattray & Jones, 2005). A total of 600 participants was therefore set at the *a priori* minimum size for the development sample (i.e. 300 participants for each of the two analytic subsamples). The eventual sample of 981 participants was therefore considered adequate.

A separate subsample was used to examine the test-retest reliability, with only

the University of Adelaide students completing the ADES a second time<sup>22</sup>. *A priori* power analysis was undertaken using the Gpower computer program (Faul, Erdfelder, Lang, & Buchner, 2014) to determine the required size for this subsample. For a two-tailed correlation, analysis indicated that a minimum sample size of nine was required to detect acceptable reliability ( $r = 0.8$ ) with 80% power and  $\alpha \leq .05$ . The eventual subsample of 83 participants therefore met this minimum.

Validation was performed on the total sample. Post-hoc sensitivity analysis using Gpower (Faul et al., 2014) was used to examine the statistical power of this analysis. Testing a point biserial correlation model with a listwise sample size of 876 and 80% power, a small-medium effect size ( $|\rho| = 0.09$ ) would be detected at  $\alpha \leq .05$  (J. Cohen, 1988).

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<sup>22</sup> Ethical requirements precluded the attachment of identifiers to school students' data, meaning that it was not possible to include these participants in the examination of test-retest reliability.

## **7.2 Paper 2 - The Adolescent Distress-Eustress Scale: Development and Validation**

Paper 2 is presented here in its manuscript format in the same typeset as the rest of the thesis. The published journal format appears as Appendix G. Content published as online supplemental material for the article appears in Appendix I.

### **Statement of Authorship**

*Title of Paper:* The Adolescent Distress-Eustress Scale: Development and validation

*Publication status:* Published

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### **Principal Author**

*Name of Principal Author (Candidate):* Victoria Branson

*Contribution to the Paper:* Developed rationale for the study and devised aims and hypotheses. Planned and carried out data collection. Cleaned data and performed data analysis. Drafted, wrote, and submitted article, then revised and responded to reviewer comments. Acted as corresponding author.

*Overall Percentage (%):* 85%

*Certification:* This paper reports on original research I conducted during the period of my Higher Degree by Research candidature and is not subject to any obligations or contractual agreements with a third party that would constrain its inclusion in this thesis. I am the primary author of this paper.

*Signature:*

*Date:* 26 November 2019

### **Co-authors**

By signing the Statement of Authorship, each author certifies that:

- i. The candidate's stated contribution to the publication is accurate (as detailed above);
- ii. Permission is granted for the candidate to include the publication in the thesis; and
- iii. The sum of all co-author contributions is equal to 100% less the candidate's stated contribution.

*Name of Co-Author:* Dr. Matthew J Dry

*Contribution to the Paper:* Advised on research design, planning, and analysis of data. Oversight of statistics and modelling; contribution to statistical analysis. Supervised the preparation of manuscript and provided editorial and structural feedback on paper.

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*Date:* 26 November 2019

*Name of Co-Author:* Associate Professor Edward Palmer

*Contribution to the Paper:* Supervised development of the work and advised on research design and planning. Provided guidance on the preparation of manuscript and editorial and structural feedback on the paper.

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*Date:* 26 November 2019

*Name of Co-Author:* Professor Deborah Turnbull

*Contribution to the Paper:* Supervised development of the work and general oversight of design and implementation. Provided guidance on the preparation of manuscript and editorial and structural feedback on the paper.

*Signature:*

*Date:* 26 November 2019

### 7.2.1 Abstract

Lay definitions tend to conceptualise stress as negative, undesirable, and maladaptive. However, contemporary stress models emphasise the differentiation between negative and positive stress responses, known as distress and eustress. Despite prominent theoretical conceptualisations accepting the existence of eustress, the vast majority of stress measures tend to focus exclusively on the distress response. The current study introduces the Adolescent Distress-Eustress Scale (ADES) which holistically captures both aspects of the stress response, bridging the gap between theory and measurement and counteracting the typically negatively-focused approach to stress research. The ADES was systematically developed and tested in a socio-educationally diverse sample of 981 adolescents ( $M_{age} = 15.19$ , 50.62% female). The finalised self-report scale consists of two 5-item subscales, individually indexing distress and eustress. Initial psychometric properties of the ADES are promising and the scale has the potential to meet the needs of researchers, schools, and organisations.

### 7.2.2 Introduction

Adolescence is a crucially stressful period of the lifespan (Noor & Alwi, 2013; Venning et al., 2013). During this time young people face numerous demands, experiencing numerous psychological, physical, and environmental changes (Moksnes, Løhre, et al., 2014; Noor & Alwi, 2013; Vera et al., 2012). Indeed, in a recent survey of Australian adolescents, 'stress' was found to be respondents' number one personal concern (Bailey et al., 2016). However, while the lay assumption is that 'stress' is dysfunctional and detrimental (e.g. F. Jones & Bright, 2001b), theory suggests that stress is not inherently maladaptive.

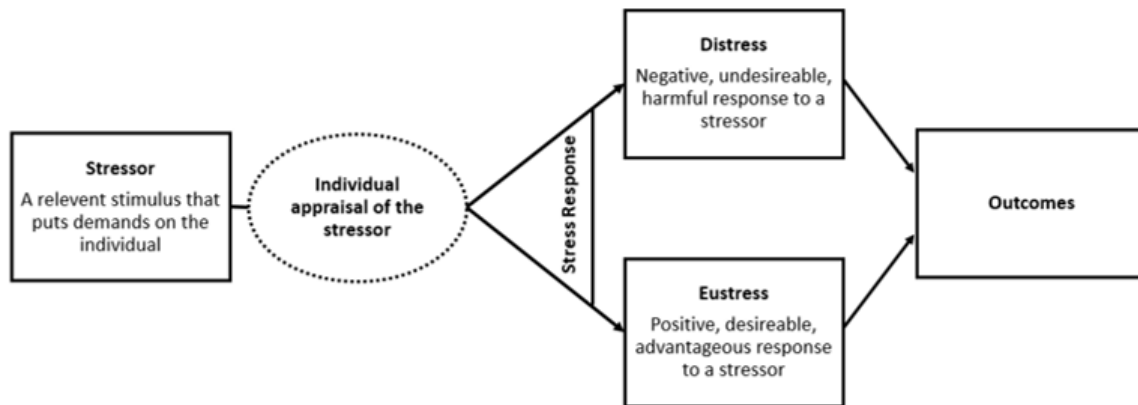
### **7.2.2.1 *Defining the stress response***

In 1974, pioneering researcher Hans Selye defined stress as “the non-specific response of the body to the demands made upon it” (p. 14). Selye argued that the body necessarily produced a response to every demand and therefore considered stress to be ubiquitous and unavoidable (Le Fevre et al., 2003). Crucially Selye’s conceptualisation delineated this response into both positive and negative aspects, known as distress and eustress.

Contemporary stress models, have retained Selye’s holistic conceptualisation, emphasising the differentiation between positive and negative stress responses. For example, the Transactional Approach (see Lazarus & Folkman, 1984), outlines that an individual’s experience of stress is dependent on their appraisal of their ability to cope with the stressor. When an individual perceives that their coping skills are inadequate, they will experience negative stress. On the other hand, if an individual perceives their coping skills as adequate, they will experience positive stress. Similarly, the Holistic Model (see Nelson & Simmons, 2003) also differentiates positive from negative stress on the basis of individualised appraisal. However, the latter model focusses more on the salient individual differences predicting the stress response. Supporting both models, empirical evidence emphasises the importance of appraisal in the experience of stress (Lazarus, 1993).

While these models accept the distinction between positive and negative stress responses, they differ in their specific conceptualisation of the stress process. This has led to poor comparison across the literature and little replication of empirical findings (Burton & Hinton, 2010). However, while significant variation does exist between models, all incorporate certain key concepts. As such, integrating across Selye’s original work and such contemporary theories, the current study adopts a partial-consensus definition of

the stress process, summarised in Figure 18 (see also Branson, Turnbull, Dry, & Palmer, 2019). This definition focuses only those key elements of the stress process for which there is agreement across the various theoretical models and is thus necessarily broad.



*Figure 18.* A visual description of the partial-consensus definition of the stress process.

Here, a stressor is any relevant stimulus that puts a demand on an individual. This stimulus can be physical, psychological, “tangible or mentally evoked” (Meir Drexler & Wolf, 2017, p. 286). Stressors are considered to have no inherent valence, such that the stress response is subjective and dependent upon the individualised appraisal of the demand. The resultant response is delineated into both distress, the negative, undesirable, and harmful response, and eustress, the positive, desirable, and advantageous response. The two responses are considered to be distinct constructs, rather than extremes on a continuum. As such, individuals can simultaneously experience distress and eustress.

#### **7.2.2.2 Measuring the stress response**

Despite prominent theoretical conceptualisations accepting eustress, the concept of ‘positive stress’ has received markedly less research interest (e.g. Le Fevre et al., 2006; Le Fevre et al., 2003). Correspondingly, the overwhelming majority of stress measures focus exclusively on what this paper defines as distress. For example, the commonly



utilised Perceived Stress Scale (S. Cohen et al., 1983; S. Cohen & Williamson, 1988) characterises stress as a pathological condition. Similarly, another frequently used measure, the Depression Anxiety Stress Scale (DASS; Lovibond & Lovibond, 1995), defines stress as an exclusively negative emotional state. One exception however is the Academic Eustress Scale (O'Sullivan, 2011), which focuses on the process of responding positively to academic stressors as well as the positive outcomes of this process. In response to the lack of validated, reliable measures, various authors have used positive and negative emotional states as proxy measures of distress and eustress (e.g. J. R. Edwards & Cooper, 1988; Parker & Ragsdale, 2015).

To the best of our knowledge, only three published scales holistically measure both distress and eustress: the Self-Report Stress Response Questionnaire (Hargrove et al., 2014), the Valencia Eustress-Distress Appraisal Scale (Rodríguez et al., 2013), and the Stress Professionnel Positif et Négatif (De Keyser & Hansez, 1996). However, all three measures have restricted populations of interest, being developed within the context of organisational psychology and specifically focussing on the adult work environment. Applying these vocational, adult-focused measures to the adolescent context is inappropriate when considering the unique developmental contexts and idiosyncrasies of young people (e.g. Compas, 1987b). There is thus a need for an adolescent-focussed measures that captures the distinction between positive and negative stress.

### ***7.2.2.3 The current investigation***

The near-exclusive use of negatively-biased measures serves to perpetuate the lack of research on positive eustress. To counteract this negative focus, a more balanced approach is required, which holistically takes into account both the negative and positive aspects of the stress response. The overarching goal of the investigation was therefore to develop a brief, reliable, and valid measure of the adolescent stress response. This

approach can be contextualised within the field of Positive Psychology, expanding the exclusively deficit-focussed approach to highlight positive human assets (Seligman & Csikszentmihalyi, 2000; Waters, 2011).

Imposing adult measures on young people discounts the unique developmental context of adolescence (e.g. Compas, 1987b). As such, the measure was specifically designed for use in populations aged between 12 and 20 years (as per the South Australian Mental Health Survey definition of adolescence; Venning et al., 2013), with regards to both the content of the scale and the language and format.

The current study introduces the Adolescent Distress-Eustress Scale (ADES). This scale addresses the disjunct between theory and measurement by holistically capturing both aspects of the stress response, with individual subscales indexing distress and eustress (ADES-D and ADES-E respectively). Specifically, the paper aims to: (1) design the ADES by optimising a preliminary collection of items, (2) evaluate internal and test-retest reliability of the ADES, (3) demonstrate initial construct validity of the measure by assessing convergent and divergent associations, and (4) determine measurement invariance across genders.

### **7.2.3 Method**

The ADES was established following DeVellis's (2012) practical guidelines for scale development. This framework, which is based on the tenets of Classical Test Theory, outlines four major steps in the development of a questionnaire: defining the constructs, creating, then reviewing the scale items, then evaluating the psychometric properties of the scale. The initial three stages of this process were informed by a series of preliminary qualitative studies, summarised briefly below and described in more detail elsewhere (Branson, Turnbull, et al., 2019). The current paper chiefly focusses however on the

evaluation stage of scale development, describing the optimisation and testing of the ADES.

### **7.2.3.1 *Item generation and refinement***

The creation of the ADES was a collaborative enterprise between the research team and the intended adolescent respondents (Compas et al., 1987; J. Mason & Danby, 2011). To identify potential effect indicators of the stress response, individual interviews were conducted with 20 adolescents (50% female, 13-20 years old), to elicit their personal experience of stress. These interviews focussed on the phenomena that adolescents identified as compellingly and effectively differentiating between distress and eustress. On the basis of these qualitative results, 463 candidate items were generated for consideration in the final scale.

These items were then sent to subject matter experts for feedback regarding content validity, clarity, and developmental appropriateness. Furthermore, cognitive interviews were conducted with 12 adolescents (50% female, 13-19 years old) to identify and amend the elements of the draft questionnaire proving problematic for the intended respondents. Based on this review process, the items were refined, improved, and combined to form a cohesive preliminary scale consisting of 25 candidate items per subscale.

### **7.2.3.2 *Participants and procedure***

To obtain a broad, generalisable sample, students (over the age of 13) from three different educational institutions of varying socio-educational advantage (independent private school, university, and public government school) were invited to take part in the online survey. Ethical considerations emphasised anonymity, confidentiality, informed consent (participant, and where necessary parental), and safeguarding participants' emotional wellbeing. All procedures were approved by The University of Adelaide School

of Psychology: Human Research Ethics Subcommittee (Code Numbers: 17/10 and 17/65) and the Department of Education and Child Development (Reference CS/17/000,747-1.14).

#### *7.2.3.2.1 Split samples procedure*

For analysis purposes, the total sample ( $N = 981$ ) was randomly split into two approximately equivalent subsamples. One half, the Development Subsample, was used for item selection and scale optimisation through exploratory factor analysis (EFA). The second, Cross-checking Subsample was used to support these results through confirmatory factor analysis (CFA). The size of each subsample exceeded the commonly recommended minimum of 300 participants required for factor analysis (e.g. DeVellis, 2012).

In addition, all students recruited from the University were asked to complete the preliminary ADES a second time within one week of the initial questionnaire. This Follow up Subsample was used to evaluate the test-retest reliability of the scale. Internal reliability and validity were evaluated using the total sample.

#### *7.2.3.2.2 Description of sample*

The socio-demographic characteristics of participants are presented in Table 21.

Table 21

*Sample Sociodemographic Characteristics*

Characteristic	Main Sample ( <i>N</i> = 981)	Subsamples		
		Development subsample ( <i>n</i> = 491)	Cross-checking subsample ( <i>n</i> = 490)	Follow up subsample ( <i>n</i> = 83)
Age, <i>M</i> ( <i>SD</i> )	15.19 (1.70)	15.19 (1.96)	15.19 (1.70)	18.73 (0.86)
Gender, <i>n</i> (%)				
Male	477 (48.62)	237 (48.27)	240 (48.98)	19 (75.90)
Female	497 (50.62)	251 (51.12)	246 (50.20)	63 (22.89)
Other	7 (0.71)	3 (0.61)	4 (0.82)	1 (1.20)
Language background <i>n</i> (%)				
English	763 (77.78)	383 (78.00)	380 (77.55)	51 (61.45)
Other	218 (22.22)	108 (22.00)	110 (22.45)	32 (38.55)
Educational Institution <i>n</i> (%)				
University	93 (9.48)	46 (9.37)	47 (9.59)	83 (100.00)
Private School	563 (57.39)	282 (57.43)	281 (57.35)	0 (0.00)
Public School	325 (33.13)	163 (33.20)	162 (33.06)	0 (0.00)

### 7.2.3.3 Materials

In addition to the preliminary ADES described above, the online self-report questionnaire consisted of the six established scales described below.

#### 7.2.3.3.1 Short-form Marlowe-Crowne Social Desirability Scale

Socially desirable responding, or the tendency to deny socially undesirable traits and/or emphasise socially desirable traits (Nederhof, 1985), is a common source of bias affecting the validity of self-report measures. To investigate the influence of socially desirable responding on the ADES, the Reynolds (1982) short-form of the Marlowe-Crowne Social Desirability Scale (MC-SDC-13) was included in the online questionnaire. This reliable and valid short form of the original scale (Crowne & Marlowe, 1960), consists of 13 *True-False* items and has been used in samples as young as 10-years-old (J. Wang, Fu, Zhang, & Kou, 2015). The reliability in the current sample was  $\alpha = .66$ .

#### 7.2.3.3.2 Academic Eustress Scale

The Academic Eustress Scale (AES; O'Sullivan, 2011) defines eustress as both the process of responding positively to stressors as well as the positive outcomes of this process. Specifically, this scale focusses on eustress related to academic stressors in adolescent and young adult populations. Responses to the 10-item scale range from *Never* (0) to *Always* (5), with higher mean scores indicating greater experience of academic eustress. The reliability in the current sample was  $\alpha = .83$ .

#### 7.2.3.3.3 Perceived Stress Scale

The Perceived Stress Scale (PSS-10; S. Cohen et al., 1983; S. Cohen & Williamson, 1988) frames stress as a negative, undesirable, pathological phenomenon, measuring the extent to which one finds their life to be unpredictable, uncontrollable, and overloading. Responses to the 10-item scale range from *Never* (0) to *Very Often* (4) with greater sum scores indicating greater experience of negative stress. The PSS-10 has robust

psychometric properties in both adult and adolescent samples (S. Cohen et al., 1983; S. Cohen & Williamson, 1988; S. G. Williams et al., 2017). The reliability in the current sample was  $\alpha = .87$ .

#### 7.2.3.3.4 *General Self-Efficacy Scale*

Self-Efficacy, defined as “optimistic beliefs about individual ability to deal with tasks at hand” (Luszczynska, Piko, & Januszewicz, 2011, p. 2559), was assessed via the General Self-Efficacy Scale (GSES; Schwarzer & Jerusalem, 1995). Responses to the 10-item scale range from 1: *Not at all true* (1) to 4: *Exactly true* (4), with higher total sum score indicating greater self-efficacy. The measure is considered valid for use in youths, including adolescents (Schwarzer & Jerusalem, 1995). The reliability in the current sample was  $\alpha = .85$ .

#### 7.2.3.3.5 *Orientation to Life Questionnaire*

Sense of Coherence (SOC) is defined as:

a global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that one’s internal and external environments are predictable and that there is a high probability that things will work out as well as can be reasonably be expected (Antonovsky, 1979, p. 123).

This construct was measured using the Orientation to Life Questionnaire (SOC-13; Antonovsky, 1979), which assesses SOC along three dimensions: comprehensibility, meaningfulness, and manageability. Participants respond to 13 items along a semantic differential scale with diametrically labelled continuum ends. Higher sum scores indicate greater SOC. The scale has shown acceptable reliability in studies with adolescents (e.g. Margalit & Eysenck, 1990; Moksnes, Espnes, et al., 2014). The reliability in the current sample was  $\alpha = .79$ .

#### 7.2.3.3.6 *Big Five Inventory*

The Five Factor Model (e.g. McCrae & Costa, 1997) was used to conceptualise personality in the current study. This model describes personality along five dimensions: Openness to experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. Utilising the Five Factor theoretical framework, personality was measured using the Big Five Inventory (BFI; John, Naumann, & Soto, 2008). The scale consists of 44 items with responses ranging from *Disagree strongly* (1) to *Agree strongly* (5). Subscale scores are computed as the average of the corresponding items, with higher scores indicating greater endorsement of the respective personality trait. The BFI is accessible to children as young as 10 (Soto, John, Gosling, & Jeff, 2011). Reliability in the current sample ranged from  $\alpha = .70$  to  $.84$ .

#### 7.2.3.4 *Data analysis*

Prior to data analysis, data were screened for obviously frivolous responses (Fan et al., 2006). Outliers for each variable were identified and trimmed using the Hoaglin and Iglewicz (1987) modification of the Tukey (1977) Outlier Labelling rule<sup>23</sup>. Missing data were managed via Listwise deletion (Allison, 2001; Schreiber, 2008). CFA was conducted using the software Amos Graphics (Arbuckle, 2017). All remaining analyses were conducted in SPSS Version 24 (SPSS Inc., 2017).

##### 7.2.3.4.1 *Measure optimisation*

In the first stage of analysis, the scale was optimised to be suitably parsimonious, with an ideal aim of five items per subscale (Costello & Osborne, 2005). For balance, equal numbers of items were included in the distress and eustress subscale.

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<sup>23</sup> This modification utilises the conservative boundary of 2.2 times the interquartile range



Following the recommendations of DeVellis (2012), the preliminary item pool was screened for deficient psychometric properties prior to entry into factor analysis, according to three elimination criteria. First, inter-item correlations were considered. Considering the distress and eustress items separately, items would be discarded if they shared inconsistent correlation patterns (i.e. positive correlation with some items and negative relationship with others). Furthermore, in the case of multicollinearity ( $r \geq .8$ ), only one item would be retained. Second, to ensure appropriate distribution and variance of item responses, highly skewed ( $\text{skew} > |2|$ ) and/or leptokurtic ( $\text{kurtosis} > 2$ ) items would be discarded. Finally, items sharing more than a moderate correlation with the MC-SDC-13, thereby being influenced by social desirability bias, would be discarded.

The remaining items of the preliminary ADES were subjected to a series of iterative EFAs (maximum likelihood extraction method) using the Development Subsample. As distress and eustress are expected to correlate, the solution was rotated using an oblique direct oblim rotation ( $\Delta = 0$ ). To produce a suitably parsimonious scale, items were deleted iteratively according to factor loadings, until no cross loadings exceeded  $\geq 0.3$  and either all items loaded on one factor  $\geq 0.7$  or a minimum of 5 items loaded on each factor  $\geq 0.5$  (Costello & Osborne, 2005). Furthermore, beyond exclusively statistical criteria, the appropriate theoretical alignment of items and the interpretability of the retained pool as a cohesive questionnaire were also considered (DeVellis, 2012).

Following EFA, CFA (maximum likelihood estimation method) was conducted using the Cross-checking Subsample to confirm the structure of the ADES. Model fit was evaluated primarily using the root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the Tucker-Lewis Index (TLI). A RMSEA less than 0.08 combined with a CFI and TLI greater than 0.95 was considered to indicate good model fit (Hu & Bentler, 1999; Schreiber, 2008). Following the recommendations of Schreiber

(2008), the  $\chi^2$  statistics was also reported, however, this value was not used to judge model fit as it is extremely sensitive to sample size (e.g. Cheung & Rensvold, 2002). For comparison, a one-factor model (all items loading on a single 'stress response' factor) and a second-order hierarchical model (items loading on two subscales, which loads on a single higher-order 'stress response' factor) were also estimated. Model comparison was assessed using the  $\chi^2$  difference test. However, as this test is also sensitive to sample size, differences between models were only considered practically meaningful if  $\Delta\text{CFI} \geq 0.01$  (Cheung & Rensvold, 2002).

#### *7.2.3.4.2 Measure testing*

Next the psychometric properties of the optimised 10-item measure were tested.

##### *7.2.3.4.2.1 Reliability*

To estimate internal consistency, Cronbach's alpha was computed for the finalised subscales using the re-combined total sample. DeVellis (2012) and Rattray and Jones (2005) suggest an alpha value of 0.7 as a minimum for novel scales.

To assess the temporal stability of the ADES, test-retest coefficients (Pearson's  $r$ ) were calculated in a convenience subsample consisting only of the university student cohort ( $n = 83$ ; see Table 21 for specific cohort demographics). A correlation coefficient exceeding 0.8 indicates good temporal stability, though all values exceeding 0.7 are considered useful (De Vriendt et al., 2011).

##### *7.2.3.4.2.2 Validation*

Evidence for construct validity was provided by demonstrating that the ADES a) was associated with other measures designed to measure the same thing (convergent validity); and b) related as expected with other measures of non-stress constructs (discriminant validity; Churchill, 1979).

As there is no existing measure of distress and eustress in adolescents, no scale reflects identical constructs to the ADES. The AES and the PSS-10 were consequently selected as convergent validity constructs, as their theoretical conceptualisation of 'stress' is the closest analogue to each of the ADES subscales. Validity coefficients (Pearson's  $r$ ) were calculated between the ADES-E and the AES and the ADES-D and the PSS-10, with convergent validity determined by relatively strong positive correlations. However, according to Classical Test Theory these correlations should not exceed  $\sqrt{\alpha}$  (DeVellis, 2006).

To examine discriminant validity, validity coefficients (Pearson's  $r$ ) were calculated between the ADES and three related, non-stress constructs: personality, sense of coherence, and self-efficacy. These constructs were chosen as validation items as they a) share significant conceptual and theoretical overlap and empirically demonstrated relationships with the stress response and b) were considered key concepts associated with stress by the adolescent participants of the preliminary qualitative studies. Extant literature cites strong theoretical and empirical links between the stress response and both self-efficacy (e.g. Luszczynska et al., 2011; Nelson & Simmons, 2003) and sense of coherence (e.g. Antonovsky, 1979; Moksnes, Espnes, et al., 2014), such that the constructs are negatively related to distress and positively related to eustress. Furthermore, each of the Big 5 personality traits were expected to relate to the stress response. Conscientiousness and Neuroticism share the greatest theoretical and conceptual overlap with stress, with the former being positively related with eustress (e.g. Rice, 1999; Saksvik & Hetland, 2011) and the latter with distress (e.g. B. D. Edwards et al., 2014; Saksvik & Hetland, 2011). Openness, Extraversion, and Agreeableness share little conceptual overlap with the stress response. In the sense that they broadly represent positive interactions with the world, these traits may relate positively to

eustress and negatively to distress, however, these relationships were expected to be weak-to-negligible (Saksvik & Hetland, 2011). Appropriate discrimination was considered according to the traditional Campbell and Fiske (1959) cut-off, whereby a correlation less than 0.8 demonstrates evidence of discriminant validity.

#### 7.2.3.4.2.3 Measurement invariance

Measurement invariance refers to the extent to which a scale performs equivalently across different groups of respondents. If measurement invariance is not established, one cannot decisively ascertain if score differences across groups reflect true construct difference between those groups or differences in the scale's performance across the groups (Cheung & Rensvold, 2002; DeVellis, 2006). As extant literature suggests that gender differences should be expected on ADES scores (e.g. Almeida & Kessler, 1998; Flook, 2011), the current study considered the measurement invariance of the ADES across gender groups via multi-group confirmatory factor analysis (MCFA). MCFA examines the changes in fit indices as increasingly restrictive cross-group constraints are progressively imposed on the measurement model (Brown, 2015; Cheung & Rensvold, 2002).

According to the recommendations of Vandenberg and Lance (2000) three increasingly restrictive models were iteratively examined to determine the degree of model invariance across genders. In the first model, only the measurement model pattern is constrained to be equal across groups (known as configural invariance), then the factor loadings (metric invariance), and finally the factor variances and covariance (variance-covariance invariance). As with regular CFA, meaningful model differences were considered at  $\Delta\text{CFI} \geq 0.01$  (Cheung & Rensvold, 2002).

## 7.2.4 Results

### 7.2.4.1 *Measure optimisation*

Prior to performing EFA, two items were eliminated from the preliminary item pool for being strongly negatively skewed. No items were found to display inconsistent correlation patterns, share strong multicollinearity, or be overly influenced by social desirability bias.

Suitability of the remaining 48 items for EFA was established, with the Kaiser-Meyer-Olkin value (Kaiser, 1974) exceeding 0.6 (KMO = 0.95) and the Bartlett's Test of Sphericity (M. S. Bartlett, 1954) reaching statistical significance. Data extraction revealed the presence of 7 factors with Eigenvalues greater than 1. The first two factors contained 44.9% of the total variance in the analysis (factor one and two accounted for 32.29% and 12.63% of variance respectively). The third factor accounted for 4.46% of the variance and each subsequent factor less than 3%. Inspection of the scree plot was inconclusive, suggesting either a two or three factor solution. Parallel analysis supported a three-factor solution, with three components with Eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix of the same size (50 variables, 491 respondents). To determine optimal factor structure, both the two- and three-factor solutions were examined. Comparing the factor loading tables, the two-factor solution resulted in stronger factor loadings and less cross-loadings. Given this comparison, the large differences between variance accounted for by factors one and two compared to factor three, and the increased interpretability and theoretical-alignment of a two-factor solution, subsequent EFA fixed the number of factors to two.

The items loading on the first factor were predominantly intended to measure distress, while the items loading on the second factor were predominantly intended to measure eustress. This indicated Factor 1 represents Distress, while Factor 2 represents

Eustress. All items loaded on one factor  $\geq 0.32$ , establishing that they share more than 10% overlapping variance with other items in the factor.

Next, to produce a suitably parsimonious scale, item deletion occurred iteratively. Items with the lowest factor loadings were dropped in sequence until no item showed cross loading  $\geq 0.3$  and 5 items loaded on each factor  $\geq 0.5$  (Costello & Osborne, 2005). In addition, attention was paid to the theoretical alignment of items and the interpretability of the remaining items as a cohesive questionnaire.

The final factor solution after oblique rotation (see Table 22) accounted for 64.70% of the variance. The correlation between the factors was weak ( $r = -.32$ ), suggesting that the subscales serve as suitably independent dimensions.

Table 22

*Pattern Matrix for EFA with Direct Oblim Rotation of the Final Two Factor Solution of the Retained Preliminary ADES Items*

Item	Factor	
	1	2
I felt anxious.	<b>.86</b>	.03
I felt overwhelmed.	<b>.79</b>	.02
I felt panicked.	<b>.78</b>	.05
I was frustrated with myself.	<b>.68</b>	-.02
My mind was racing out of control.	<b>.68</b>	-.12
I felt the outcome was worth the effort.	.04	<b>.78</b>
I felt determined.	.03	<b>.73</b>
I felt proud for dealing with the pressure.	-.13	<b>.72</b>
I felt motivated.	.09	<b>.70</b>
I was satisfied with how I dealt with the pressure.	-.12	<b>.66</b>

*Note.* Major loadings for each item are bolded. Factor correlation  $r = -.32$ . ADES =

#### Adolescent Distress-Eustress Scale

To confirm the 10-item, two factor oblique structure found in EFA (see Figure 19), CFA was conducted using the cross-checking subsample. The two-factor model demonstrated acceptable model fit; Table 23 summarises the latent factor loadings and fit indices. Furthermore, neither the one-factor nor the hierarchical model meaningfully improved data fit (Table 24). Together these results support the two-factor oblique model found via EFA as the most appropriate design of the ADES.

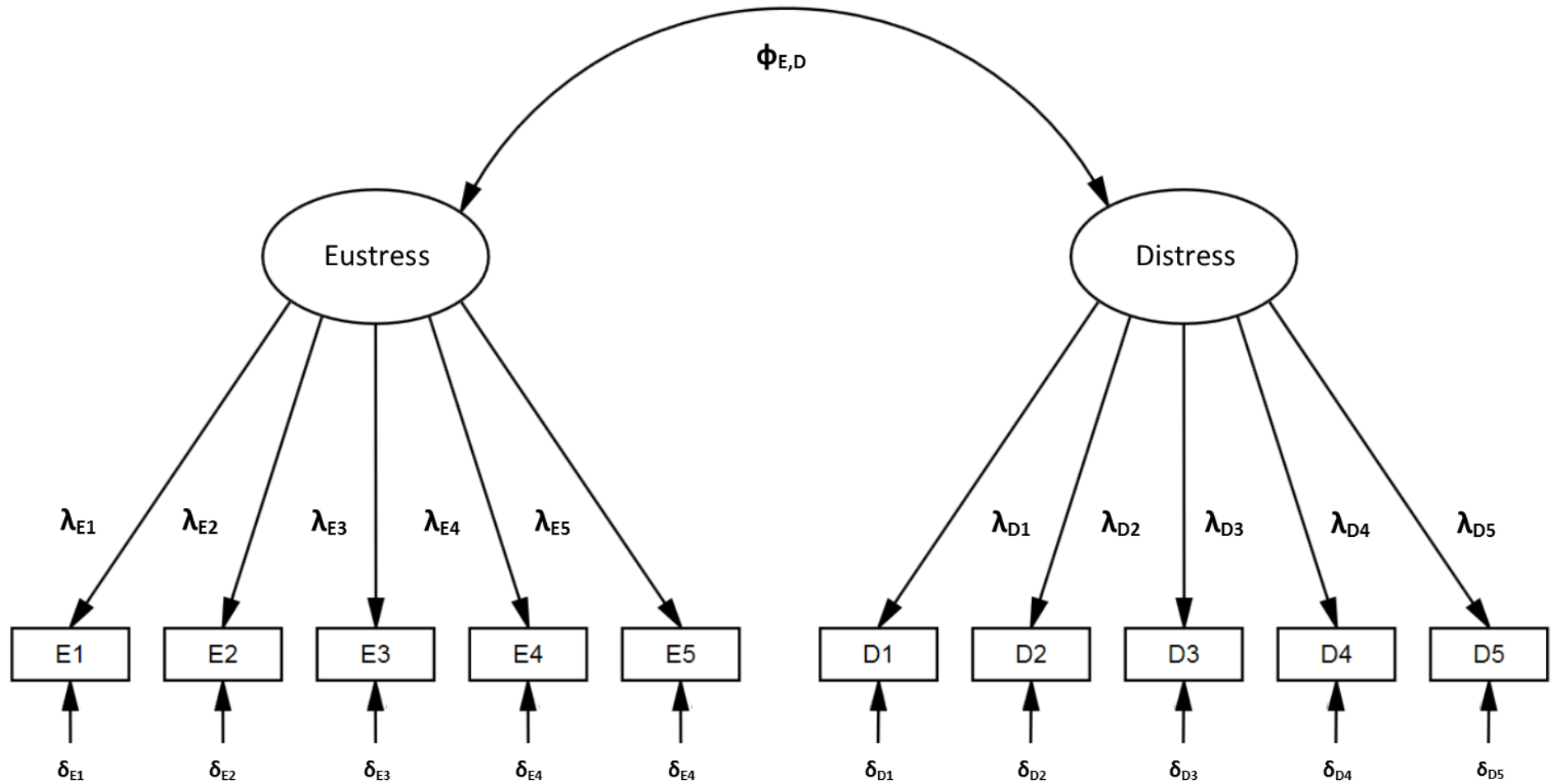


Figure 19. Two factor oblique model with 10 indicator items. See Table 23 for estimated confirmatory loadings, covariances, and model fit.



Table 23

*Latent Factor Loadings and Fit Indices in CFA for the Final 10-Item Measure (see Figure 19 for the Estimated Model)*

Factor/question		Estimates
Eustress		
<i>I felt motivated</i>	$\lambda_{E1}$	.77
<i>I felt the outcome was worth the effort</i>	$\lambda_{E2}$	.66
<i>I was satisfied with how I dealt with the pressure</i>	$\lambda_{E3}$	.62
<i>I felt determined</i>	$\lambda_{E4}$	.75
<i>I felt proud for dealing with the pressure</i>	$\lambda_{E5}$	.60
Distress		
<i>My mind was racing out of control</i>	$\lambda_{D1}$	.74
<i>I felt panicked</i>	$\lambda_{D2}$	.80
<i>I felt overwhelmed</i>	$\lambda_{D3}$	.79
<i>I felt anxious</i>	$\lambda_{D4}$	.76
<i>I was frustrated with myself</i>	$\lambda_{D5}$	.69
Latent factor covariances		
Distress~Eustress	$\Phi_{D,E}$	-.34
Model Fit		
RMSEA [90CI]		.07 [.06-.09]
CFI		.95
TLI		.94
$\chi^2 (df)$		123.41** (34)

*Note.* All estimates are standardised. CFA = confirmatory factor analysis; RMSEA: root mean square error of approximation; CI = confidence interval; CFI: comparative fit index; TLI: Tucker-Lewis Index.

\*\* $p < .01$ .

Table 24.

*Model Fit Statistics for a Two-Factor Model, One-Factor Model, and Second-Order Hierarchical Model of ADES Items*

Model	Comparison	$\chi^2$ (df)	RMSEA [90CI]	CFI	TLI	$\Delta\chi^2$ (df)	$\Delta$ CFI
1. Two-factor model		123.41** (34)	.07 [.06-.09]	.95	.94		
2. One-factor model	2-1	721.17** (35)	.20 [.19-.21]	.65	.55	597.76** (1)	-.30
3. Second-order hierarchical model	3-1	123.41** (34)	.07 [.06-.09]	.95	.94	N/A <sup>a</sup>	.00

*Note.* ADES = Adolescent Distress-Eustress Scale; RMSEA: root mean square error of approximation; CI = confidence interval; CFI: comparative fit index; TLI: Tucker-Lewis Index.

<sup>a</sup> Models 1 and 3 are equivalent and cannot be distinguished on statistical grounds; comparison must therefore be based on theory and interpretability.

\*\*p < .01.

#### 7.2.4.1.1 Final measure and instructions

At the conclusion of the measure optimisation process, the ADES was finalised to consist of two correlated subscales each consisting of five items (see Table 25). The scale is evaluative rather than prescriptive, exclusively describing the adolescent stress response rather than offering any diagnostic criterion.

Table 25.

#### Final 10-item ADES Measure

Item	Question
E1	I felt motivated.
D1	My mind was racing out of control.
E2	I felt the outcome was worth the effort.
E3	I was satisfied with how I dealt with the pressure.
D2	I felt panicked.
D3	I felt overwhelmed.
D4	I felt anxious.
E4	I felt determined.
E5	I felt proud for dealing with the pressure.
D5	I was frustrated with myself.

*Note.* Participants were given the following instructions: “These questions are about **how you respond to pressure**. Everybody responds to pressure differently at different times. Pressure can be good for you, bad for you, or a bit of both. For each item below, please choose the answer that best describes how you responded to pressure **in the last 7 days.**” Each item is scored on a 5-point Likert-type scale; only the two extremes and the midpoint are labelled: *Not like me* [0], *Somewhat like me* [2], and *Very much like me* [4]. Scores are computed as the sum of the 5 corresponding items, and results presented separately across subscales: ADES-Distress = Sum(D1,D2,D3,D4,D5); ADES-Eustress = Sum(E1,E2,E3,E4,E5). ADES = Adolescent Distress-Eustress Scale

Table 26 displays the descriptive statistics for the ADES in the current sample.

Table 26

*Descriptive Statistics of the ADES in the Current Sample (N = 981)*

	<i>M</i>	<i>SD</i>	Min	Max	Skewness	Kurtosis	Interquartile Range
ADES-E	10.43	4.60	0.00	20.00	-0.11	-0.53	6.50
ADES-D	9.08	5.39	0.00	20.00	0.18	-0.88	8.00

*Note.* ADES subscale scores could theoretically range from 0 to 20, with higher scores indicating greater experience of that aspect of the stress response. ADES = Adolescent Distress-Eustress Scale.

#### **7.2.4.2 Measure testing**

Using the final 10-item scale, reliability, validity, and measurement invariance were evaluated.

##### **7.2.4.2.1 Reliability**

Estimates of internal consistency were computed for the finalised subscales using the re-combined total sample. According to DeVellis's (2012) conventions, both subscales had very good reliability (ADES-D:  $\alpha = .87$ ; ADES-E :  $\alpha = .83$ ).

The Follow up Subsample completed the ADES a second time within one week of the initial questionnaire (mean number of days between Time 1 and Time 2 was 3.31, *SD* = 1.17). Test-retest reliability was strong for both the distress subscale ( $r(81) = .86$ ,  $p < .01$ ) and the eustress subscale ( $r(81) = .81$ ,  $p < .01$ ), indicating good temporal stability of the ADES scores.

##### **7.2.4.2.2 Validity**

The ADES was appropriately correlated with the convergent validity scales. As expected there were strong positive relationships between the ADES-E and the AES ( $r(874) = .60$ ,  $p < .001$ ) and between the ADES-D and the PSS-10 ( $r(874) = .68$ ,  $p < .001$ ).

Neither of these correlations exceeded  $\sqrt{\alpha}$  for their respective subscales (ADES-E = .91, ADES-D = .93). These results provide evidence for the convergent validity of the ADES.

Table 27 summarises the expected relationships between the ADES and the three individual difference variables (self-efficacy, sense of coherence, and personality), based on the direction and relative strength of the correlation. All correlations were below .80, providing evidence for discriminant validity and indicating that the ADES is sufficiently distinct from these related, non-stress constructs (Campbell & Fiske, 1959).

Encouragingly, the ADES showed comparable or superior discriminant validity when compared to the existing stress measures (see Appendix I<sup>24</sup> for correlations between the validation constructs and the PSS and AES).

In addition, the results generally adhered to the expected pattern of correlations, with some exceptions. As expected, the ADES subscales shared relatively stronger correlations with the more similar constructs of Self-Efficacy, SOC, Conscientiousness, and Neuroticism. While these relationships were in the direction predicted, the strength of the relationships between Eustress~Conscientiousness and Distress~Neuroticism were stronger than expected. However, as expected, the weakest and non-significant correlations are with the least similar variables: Openness, Agreeableness, and Extraversion.

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<sup>24</sup> *Submitted as online supplemental material in the published paper*

Table 27

*Evidence for Discriminant Validity: Predicted and Observed Adolescent Distress-Eustress Scale Correlations with Individual Difference Variables.*

	Expected Pattern of Results		Observed Correlation	
	Distress	Eustress	Distress	Eustress
Self-efficacy	- - -	+ + +	-.39**	.46**
Sense of Coherence	- - -	+ + +	-.53**	.40**
Personality				
Openness to Experience	-	+	.02	.23**
Conscientiousness	- -	+ +	-.19**	.48**
Extraversion	-	+	-.15**	.26**
Agreeableness	-	+	-.06	.25**
Neuroticism	+ +	- -	.66**	-.31**

*Note.* Predictions are based on the expected pattern. – indicates a negative correlation is expected; + indicates a positive correlation is expected. Relative strength is indicated by the number of symbols. Listwise  $n = 876$ . ADES = Adolescent Distress-Eustress Scale.

\*\*  $p < .01$ .

#### 7.2.4.2.3 Measurement invariance

While participants had the option to indicate ‘Other’ when reporting gender, this group was too small in size ( $n = 7$ ) to include in the analysis. As such, only male and female participants were considered when evaluating the measurement invariance of the ADES across genders.

MCFA results (Table 28) indicated that the measurement invariance constraints resulted in no substantial decrement in model fit, indicating that the ADES had appropriate equivalency across genders.

Table 28

*Fit Indices and Difference Statistics for Measurement Invariance Models by Gender*

Model Description	Comparison	$\chi^2$ (df)	$\Delta\chi^2$ (df)	CFI	$\Delta$ CFI
1 Configural invariance <sup>a</sup>		237.82** (68)		.96	
2 Metric invariance <sup>b</sup>	2-1	245.63** (76)	7.81 (8)	.96	.00
3 Variance-Covariance invariance <sup>c</sup>	3-2	250.20** (79)	4.57 (3)	.96	.00

*Note.* CFI = comparative fit index.

<sup>a</sup> Measurement model pattern constrained across gender group.

<sup>b</sup> Model 1 + Factor loadings constrained across gender group.

<sup>c</sup> Model 2 + Variances and covariance between factors constrained to be equal across gender group

\*\* $p < .01$

As measurement invariance was established, Hotelling's  $T^2$  was run to determine the effect of gender on the ADES (see Table 29 for descriptive statistics according to gender). The differences between genders on the combined dependent variables was statistically significant,  $F(2, 971) = 51.14$ ,  $p < .001$ , Wilks'  $\lambda = .19$ , partial  $\eta^2 = .10$ . Using Bonferroni adjusted  $\alpha$  level of .025, post-hoc testing showed females scored higher on the ADES-D ( $M_{\text{difference}} = 3.29$ , 95% CI [2.56, 4.03],  $p < .001$ ), but no statistically significant difference was found between genders for ADES-E scores ( $M_{\text{difference}} = .49$ , 95% CI [-1.15, 0.17],  $p = .10$ ).

Table 29

*Descriptive Statistics for the ADES According to Gender*

	ADES-E		ADES-D	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Female <sup>a</sup>	10.19	4.54	10.67	5.21
Male <sup>b</sup>	10.68	4.65	7.38	5.02

*Note.* ADES subscale scores could theoretically range from 0 to 20, with higher scores indicating greater experience of that aspect of the stress response. ADES = Adolescent Distress-Eustress Scale.

<sup>a</sup>  $n = 497$ . <sup>b</sup>  $n = 477$ .

### 7.2.5 Discussion

The ADES was systematically developed and tested in a socio-educationally diverse sample of 981 adolescents. This scale was specifically designed for adolescent participants, with input from young people at every stage of item generation and scale refinement.

The first aim of the current study was to design the ADES from a collection of preliminary items. The scale was optimised using a pre-defined, iterative procedure



incorporating item performance statistics and EFA. These results were then cross-checked in a separate subsample, with a two-factor oblique model supported as the most appropriate design of the ADES. The finalised scale consists of two 5-item subscales, which individually index distress and eustress. The two subscales were only weakly negatively correlated, suggesting that the scales are related, but suitably independent dimensions.

Initial psychometric properties for the ADES are promising. Addressing Aim 2, the internal reliability and temporal stability of both subscales was very good and exceeded the minimum requirements for a novel scale (De Vriendt et al., 2011; DeVellis, 2012; Rattray & Jones, 2005). Furthermore, results provided promising initial evidence for construct validity. Addressing Aim 3, the ADES was strongly correlated with established stress measures and related as expected with other non-stress constructs. Finally, in investigating Aim 4, the scale demonstrated measurement invariance across genders. This indicates the score differences found between males and females using the ADES may be interpreted to indicate true differences in the stress response, rather than as artefacts of the scale's performance across groups. This is pertinent given the current female participants were found to have significantly higher ADES-D scores.

#### **7.2.5.1 Implications**

The ADES is, to the best of our knowledge, the first measure that holistically takes into account both the positive and negative aspects of the adolescent stress response. As such, this measure serves to bridge the gap between theory and measurement, more appropriately reflecting the two-factor approach of prominent conceptualisations of stress (e.g. Lazarus & Folkman, 1984; Nelson & Simmons, 2003; Selye, 1974). Furthermore, by highlighting the positive aspects of stress, the ADES serves to counteract the negative-focus and provide a more balanced approach to stress research.

### **7.2.5.2 Limitations and future research directions**

While the current results are promising, it is recognised that demonstrating the psychometric properties of a novel scale is an ongoing, cumulative effort (DeVellis, 2012). Several important considerations should be taken when interpreting the results of the present study.

#### **7.2.5.2.1 Restrictive sampling**

Attempts were made to avoid restricted sampling by considering both the size and the composition of the development sample (S. Cohen et al., 1983; DeVellis, 2012). However, the present sample was relatively homogenous with regard to several demographic factors, most pertinently cultural and language diversity. In the current sample, 77.8% of participants exclusively spoke English at home, exceeding the national rate of 72.7% (Australian Bureau of Statistics, 2017a). Furthermore, by sampling from exclusively educational contexts, adolescents in the workforce, vocational training, and those unengaged in any formal system were overlooked. In addition, all participants were volunteers and the majority required parental consent, likely leading to selection bias.

These issues of restrictive sampling were compounded in the examination of test-retest reliability. Given the pragmatic restrictions around collecting data in schools, the analysis was performed on a convenience subsample of only university students, leaving it open to several limitations such as non-generalisation and bias (De Vriendt et al., 2011). Furthermore, participant drop-out between initial and follow-up assessment was potentially selective. For example, participants may have dropped out due to higher levels of stress (Laferton, Stenzel, & Fischer, 2016).

Together these sampling limitations constrain the generalisability of the current results. Researchers utilising the ADES should thus consider how their specific research

situation differs from the current setting, how these differences may affect the validity of the scale, and the implications of this on the research conclusions (DeVellis, 2012).

Future work, should look to reproduce the current findings in a broader, diverse, more generalisable sample. A further priority is to examine the psychometric properties of the ADES in specific populations, such as cross-cultural and Indigenous groups or in adolescents not engaged in the education system.

#### *7.2.5.2.2 Further validation work*

Validation of a scale is a long-term process (Peacock & Wong, 1990); the current study provides only initial support for construct validity and future research must examine a wider range of constructs. Furthermore, by only including one type of measurement method (self-report), the current study cannot account for common-method biases (Churchill, 1979), defined as “variance that is attributable to the measurement method rather than to the constructs the measures represent” (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003, p. 879). Further work should therefore look to determine the associations of the ADES with non-self-report measures of the same constructs, such as parent- or teacher-report scales.

#### *7.2.5.2.3 Influence of contextual factors*

As part of the development study, the current participants completed the scale together with all preliminary, subsequently discarded, items. This unique condition likely exerted an influence on pertinent contextual factors, such as respondent fatigue, question order, and motivation, thereby effecting responses to the scale items (DeVellis, 2012). Replication of results utilising only the finalised ADES is therefore necessary.

#### *7.2.5.2.4 Clinical cut-offs and norms*

As the ADES was developed as an exclusively descriptive tool, no specific clinical cut-offs or diagnostic criteria were established. Given then that the units of the ADES are

arbitrary, individual scores viewed in isolation may not provide a researcher and/or clinician with adequate meaning. Future research could look to develop population norms, which would impute more meaning into individual scores (Churchill, 1979). Furthermore, researchers may look to develop threshold levels for intervention purposes. While not diagnostic criteria, such thresholds would identify individuals likely to benefit from intervention (Kern et al., 2016).

#### **7.2.5.3 Conclusion**

Limitations notwithstanding, the initial results presented here suggest the ADES as a brief, reliable, and psychometrically sound scale. Given the clarity and simplicity of both delivery and scoring, this self-report scale has the potential to meet the needs of researchers, schools, and other adolescent-focused organisations in the fields of both education and psychology. In conclusion, with replication in broader samples and further validation the ADES provides a promising tool for both theory and practice.

### 7.3 Further Evaluation of the Adolescent Distress-Eustress Scale

The finalised ADES consists of two 5-item subscales, which individually index eustress and distress. Each item is scored on a 5-point Likert-type scale, with responses ranging from *Not like me (0)* to *Very much like me (4)*, with greater sum subscale scores indicating greater experience of the applicable stress response. Examining the optimised scale's readability metrics revealed the ADES has a FKGLR score of 4.1, meaning the scale is readable by the average young person aged 9 years and above. This is well below the youngest anticipated respondent age (i.e. 12 years) and meets the readability criteria of  $FKGLR < 5$  described for the prior review stage (Section 6.2, p. 160)

The results of Paper 2 suggested that the ADES is a brief, reliable, and psychometrically sound scale. However, several limitations of the evaluation study were outlined, including restrictive sampling, need for replication and a descriptive frame of reference, and the possible influence of contextual factors. This final section of Chapter 7 describes further evaluation of the ADES conducted subsequent to Paper 2, which aimed to redress these limitations. Firstly, using data collected as part of other empirical studies, the psychometric properties of the ADES were replicated and extended, strengthening evidence for the scale's validity and reliability. Secondly, to aid the meaningful interpretation of the ADES, an empirical frame of reference for the scale was sought through the development of population norms, percentile ranks, and qualitative descriptors based on a large sample representative of the Australian adolescent population. Finally, to ensure that the scale could be successfully utilised by all relevant stakeholders, including those less familiar with psychological testing, a scale manual and interactive excel worksheet were produced, encapsulating practically relevant, accessible, and user-friendly material relating to the development, administration, and interpretation of the ADES.

### **7.3.1 Additional Evidence for the Psychometric Properties of the Adolescent Distress-Eustress Scale**

Subsequent to the initial development and validation presented in Paper 2, the ADES was used in three other empirical studies at the University of Adelaide: Paper 3 of the current thesis (Chapter 8; Branson, Palmer, Dry, & Turnbull, 2019) and two unpublished Undergraduate Honours theses (Preston, 2019; Schulz, 2018). Data from these studies were examined to replicate the psychometric properties of the ADES in additional samples and to investigate the content validity of the scale using known-groups validation. This additional analysis served to further substantiate the psychometric properties of the ADES.

#### **7.3.1.1 Replication and further validation of the ADES in additional samples**

##### *7.3.1.1.1 Branson, Palmer, et al. (2019) i.e. Paper 3*

As part of data collection for Paper 3 of the current thesis (see Chapter 8), 1,018 socio-educationally diverse adolescents (13-20 years old; 54.03% female) completed an online survey comprising the ADES plus measures of illbeing, health behaviours, and individual differences. To replicate initial evaluation results, these data were analysed following the same procedures as in Paper 2 (see Section 7.2.3.4, p. 206, for a description of the analysis method).

##### **7.3.1.1.1.1 Results**

*Internal Reliability.* Both subscales had very good internal reliability (ADES-D:  $\alpha = .88$ ; ADES-E:  $\alpha = .80$ ).

*Confirmatory Factor Analysis.* The 10-item, two-factor oblique model of the ADES demonstrated acceptable model fit ( $\chi^2 (34) = 252.86, p < .01$  CFI = .95, TLI = .94, RMSEA = .08 [.07-.09]). Latent factor loadings ranged between .57 and .86, see Figure 20.

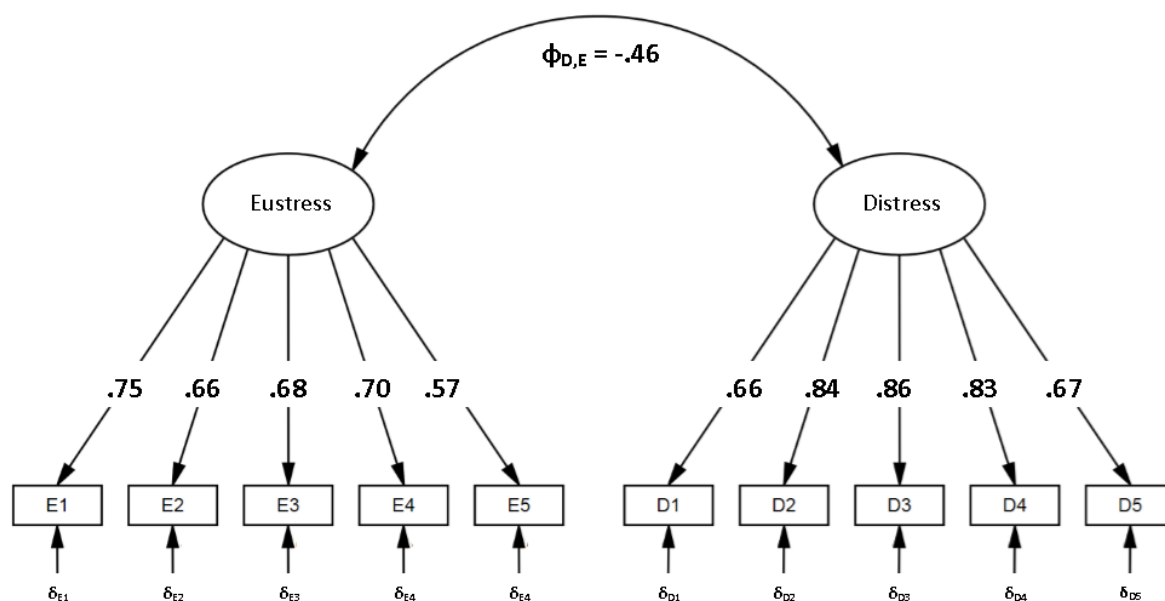


Figure 20. Confirmatory factor analysis results for the ADES using Paper 3's sample.

*Validation.* As part of Paper 3, participants completed the General Self-Efficacy Scale (GSES; Schwarzer & Jerusalem, 1995). Supporting the construct validity of the ADES, the pattern of correlations between the ADES subscales and the GSES replicated that found in Paper 2 (ADES-E:  $r(978) = .50, p < .001$ , ADES-D:  $r(978) = -.38, p < .001$ ).

*Measurement Invariance.* MCFA results (Table 30) indicated that the measurement invariance constraints resulted in no substantial decrement in model fit, indicating that the ADES had appropriate equivalency across male and female respondents.

Table 30

*Fit Indices and Difference Statistics for Measurement Invariance Models of the ADES by Gender (Male vs. Female) using Paper 3's Sample*

	Model Description	Comparison	$\chi^2$ (df)	$\Delta\chi^2$ (df)	CFI	$\Delta$ CFI
1	Configural invariance <sup>a</sup>		280.05** (68)		.95	
2	Metric invariance <sup>b</sup>	2-1	290.24** (76)	10.19 (8)	.95	.00
3	Variance-Covariance invariance <sup>c</sup>	3-2	294.55** (79)	4.31 (3)	.95	.00

<sup>a</sup> Measurement model pattern constrained across gender group.

<sup>b</sup> Model 1 + Factor loadings constrained across gender group.

<sup>c</sup> Model 2 + Variances and covariance between factors constrained to be equal across gender group

\*\* $p < .01$



#### 7.3.1.1.1.2 Conclusion

Overall, the promising psychometric properties of the ADES were replicated when evaluating the scale in Paper 3's sample. As mentioned in the limitations section of Paper 2 (Section 7.2.5.2.3, p. 225), participants in the development study completed the ADES together with all preliminary, subsequently discarded, items, potentially influencing pertinent contextual factors (e.g. fatigue, motivation etc.) and affecting responses to scale items. The replication of the psychometric properties using only the finalised ADES serves to resolve this limitation and further validate the scale.

#### 7.3.1.1.2 Schulz (2018)

As part of an undergraduate Psychology Honour's degree at the University of Adelaide, Schulz (2018) delivered the ADES online to 70 university students (17-20 years old, 64.3% female) alongside measures of intellectual ability, personality traits, academic satisfaction, self-efficacy, and psychological health. Data from this study were accessed in line with appropriate ethical considerations (University of Adelaide School of Psychology: Human Research Ethics Subcommittee Code Number: 18/20) and analysed to evaluate the reliability and validity of the ADES in this sample.

##### 7.3.1.1.2.1 Results

*Internal Reliability.* The ADES-E had respectable internal reliability ( $\alpha = .77$ ), while the ADES-D had very-good internal reliability ( $\alpha = .91$ ).

*Validation.* As part of the online questionnaire, Schulz administered the GSES and the Openness Conscientiousness Extraversion Agreeableness Neuroticism Index Condense (OCEANIC) scale of personality (Schulze & Roberts, 2006). Further strengthening the evidence for the construct validity, the overall directional pattern of correlations between these measures and the ADES (Table 31) replicated those found in Paper 2. However, while the direction of correlations was as expected, many of the

observed associations did not reach statistical significance. It was suspected that this related to the small sample size of the study; post hoc sensitivity analysis undertaken using the Gpower computer program (Faul et al., 2014) indicated that with a listwise sample size of 64, only a large effect size ( $f^2 = 0.34$ ) would be detected at  $\alpha \leq .05$ .

Table 31

*Observed Correlations between the ADES Subscales and Self-Efficacy and Personality*

*Variables in the Schulz (2018) Sample*

	ADES-E	ADES-D
Self-Efficacy	.53**	-.17
Openness	-.13	.28*
Conscientiousness	.46**	.04
Extraversion	.22	.04
Agreeableness	.24*	.21
Neuroticism	-.32**	.63**

Note. Listwise  $N = 64$ ,

\* $p < .05$ , \*\*  $p < .01$

The Schulz paper additionally contained a measure of Stress Mindset, a construct capturing the extent to which an individual believes that stress has either enhancing or debilitating consequences for outcomes such as “performance and productivity, health and well-being, and learning and growth” (Crum et al., 2017, p. 380). In a quasi-experimental investigation of undergraduate university students, Crum et al. (2013) found that individuals who adopted a ‘stress-is-enhancing’ mindset exhibited more positive, adaptive physiological and behavioural responses in the face of stressors than those who adopted a ‘stress-is-debilitating’ mindset. It would thus be expected that a stress-is-enhancing mindset be associated with eustress, while a ‘stress-is-debilitating’ mindset may share a weaker association with distress. In the Schulz study, Stress Mindset

was operationalised using the 8-item Stress Mindset Measure (SMM-G; Crum et al., 2013); on this scale, higher scores indicate the individual endorses a 'stress-is-enhancing' mindset, whereas lower scores indicate a 'stress-is debilitating mindset'. As anticipated, there was a statistically significant, medium-to-large positive correlation between the ADES-E and the SMM-G ( $r(64) = .43, p < .001$ ), indicating that individuals adopting a 'stress-is-enhancing' mindset exhibited higher levels of eustress. Further, in line with expectations, there was a negative trend between the ADES-D and the SMM-G, however, the correlation was not statistically significant ( $r(64) = -.20, p = .12$ ). Again, it was suspected that this lack of statistical significance related to the small total sample size.

#### 7.3.1.1.2.2 Conclusion

Evaluating the ADES using the data from Schulz's (2018) Honours paper provided additional evidence for reliability and validity of the scale. While this study was limited by the small size of the sample, these findings provide additional evidence for the construct validity of the ADES

#### 7.3.1.1.3 Preston (2019)

As part of her University of Adelaide Psychology Honour's degree, Preston (2019) delivered the ADES online to 60 first year university students (age 16-20, 76.67% female) alongside measures of intelligence, personality, wellbeing, illbeing, and academic achievement. Data from this study was accessed in line with appropriate ethical considerations University of Adelaide School of Psychology: Human Research Ethics Subcommittee Code Number: 19/24) and analysed to evaluate the reliability and validity of the ADES in this sample.

#### 7.3.1.1.3.1 Results

*Internal Reliability.* Both subscales of the ADES had very good internal reliability (ADES-E:  $\alpha = .89$ ; ADES-D:  $\alpha = .87$ ).

*Validation.* As part of the questionnaire, Preston administered the OCEANIC scale of personality (Schulze & Roberts, 2006). The majority of observed correlations between this measure and the ADES (Table 32) failed to reach statistical significance. As with the Schulz study above, it was suspected this was related to the small sample size of the study; post hoc sensitivity analysis undertaken using the Gpower computer program (Faul et al., 2014) indicated that with a sample size of 60, only a large effect size ( $f^2 = 0.35$ ) would be detected at  $\alpha \leq .05$ . Of the significant correlations, as expected there were positive relationships between the ADES-D and neuroticism and the ADES-E and both Conscientiousness and Extraversion. Unexpectedly, the ADES-D shared a negligibly weak positive relationship with Openness.

Table 32

*Observed Correlations between the ADES Subscales and Personality Variables in the Preston (2019) Sample*

	ADES-E	ADES-D
Openness	.10	.28*
Conscientiousness	.27*	-.07
Extraversion	.20*	.10
Agreeableness	.02	.20
Neuroticism	-.24	.46**

\* $p < .05$ , \*\* $p < .01$

#### 7.3.1.1.3.2 Conclusion

Evaluating the ADES using the data from Preston's (2019) Honours paper provided additional evidence for the reliability of the scale. Some additional support was provided for the construct validity of the ADES, however, these findings were limited by the small sample size.

### **7.3.1.2 Known-groups validation of the Adolescent Distress-Eustress Scale**

In addition to determining if a scale relates as expected to established measures, another method of investigating construct validity is to examine relevant group differences (Cronbach & Meehl, 1955). Referred to as ‘known-groups validation’, this form of construct validity examines whether a measure can “discriminate between two groups known to differ on the variable of interest” (Davidson, 2014, para. 1).

Considering the stress response, extensive theoretical and empirical evidence has consistently found that adolescents with higher levels of psychological illbeing exhibit higher levels of distress and lower levels of eustress (e.g. Flook, 2011; Vera et al., 2012; S. G. Williams et al., 2017; see Section 8.3.2.1.1, p. 269, for further discussion). As such, it should be expected that respondents with clinically relevant levels of illbeing should exhibit significantly higher scores on the ADES-D and lower scores on the ADES-E than non-clinical controls. To test this hypothesis, data collected as part of Paper 3 were analysed for known-groups validation; method, results, and conclusions presented below.

#### **7.3.1.2.1 Method**

For Paper 3 (Chapter 8), participants completed the DASS21 (Lovibond & Lovibond, 1995), which evaluates respondents’ negative emotional states along dimensions including Depression. Within this sample of 1,018 socio-educationally diverse adolescents (13-20 years old; 54.03% female), 96 participants were classified as having ‘Extremely Severe’ scores on the DASS21 Depression subscale, suggesting they experienced clinically-significant levels of psychological illbeing (Psychology Foundation of Australia, 2018); see Table 33 for characteristics of these participants. These participants were matched with participants scoring in the ‘Normal’ range of emotional disturbance on the DASS21 according to age, gender, and language background using the

SPSS MATCH FILES command (SPSS Inc., 2017), thereby creating two sociodemographically-matched groups: the 'Clinical' group and the 'Non-clinical' group.

Table 33

*Sociodemographic Characteristics of the 'Clinical' Validation Group*

'Clinical' Population Characteristics	
Age, <i>M (SD)</i>	15.57 (1.75)
Gender, <i>n (%)</i>	
	Male 36 (37.5)
	Female 60 (62.5)
Language background <i>n (%)</i>	
	English 72 (75.0)
	Other 24 (25.0)

#### 7.3.1.2.2 Results

Hotelling's  $T^2$  was run to determine the differences between 'Clinical' and 'Non-clinical' groups on the ADES (see Table 34 for descriptive statistics according to group). Results indicated statistically significant differences between groups on the combined dependent variables,  $F(2,189) = 69.33$ ,  $p < .001$ , Pillai's Trace = .42, partial  $\eta^2 = .42$ . Using a Bonferroni adjusted  $\alpha$  level of .025, post-hoc testing indicated that the Clinical group scored significantly higher on the ADES-D ( $M_{\text{difference}} = 6.38$ ,  $p < .001$ , Cohen's  $d = 1.09$ ) and the ADES-E ( $M_{\text{difference}} = 5.47$ ,  $p < .001$ , Cohen's  $d = 1.17$ ).

Table 34

*Descriptive Statistics for the ADES According to Clinical Validation Group*

	Clinical Group		Non-Clinical Group	
	95 CI <i>M</i>	<i>SD</i>	95 CI <i>M</i>	<i>SD</i>
ADES-E	6.49 - 8.36	4.63	12.33 - 13.46	2.77
ADES-D	14.03 - 16.03	4.92	7.66 - 9.65	4.90

*7.3.1.2.3 Conclusion*

Conforming to empirical and theoretical expectations, results indicated that individuals with clinically significant emotional disturbance exhibited higher scores on the ADES-D and lower scores on the ADES-E than their age-, gender-, and language-matched peers. The large effect sizes suggested that these differences were clinically- and practically meaningful. Cohen's *d* values greater than 1 suggested that approximately 85% of individuals in the clinical population had levels of distress above the mean of the non-clinical group and levels of eustress below the mean of the non-clinical group. These results indicate that, in addition to evidence for convergent and divergent validity, the construct validity of the ADES is supported by its ability to distinguish between individuals with and without clinically significant illbeing.

**7.3.2 Developing a Normative Data Set for the Adolescent Distress-Eustress Scale**

One of the limitations of the initial evaluation study was the lack of population norms for the ADES (Section 7.2.5.2.4, p. 225). As the scale's units are arbitrary without some context against which an individual's performance can be compared isolated scores may not provide the test administrator with adequate meaning (Churchill, 1979). Therefore, to allow for more meaningful interpretation of the ADES, an explicit empirical frame of reference for the scale was sought through the development of an Australian adolescent normative data set.

A normative data set can be conceptualised as “a collection of test scores derived from the administration of an assessment to a sample that is representative of the general population” (M. E. Zimmerman, 2018, para. 1). A respondents’ scale score can therefore be meaningfully characterised through empirical comparison with the normative data (Mitrushina, Boone, Razani, & D’Elia, 2005).

#### **7.3.2.1 Sample**

Over the course of data collection for the current thesis, the ADES was delivered to a total of 1,617 individual adolescents (13-20 years old; 54.24% female) with varying levels of socio-educational advantage, providing a large sample from which to develop population norms. To ensure the derived normative sample best represented Australian adolescents, data were first screened according to demographic characteristics. As the total sample over-represented females compared to the general adolescent population (54.24% compared to 48.71%; Australian Bureau of Statistics, 2017a), 167 female cases were randomly trimmed using the Select Cases function in SPSS (SPSS Inc., 2017) to bring the gender distribution closer to the observed wider-population. Additionally, the relatively small number of individuals within the total sample identifying as gender-diverse ( $n = 19$ ) precluded their meaningful inclusion in analysis and these data were excluded and gender treated as a dichotomous variable. Sociodemographic characteristics of resultant normative sample. ( $N = 1,431$ ) are presented in Table 35.



Table 35

*Sociodemographic Characteristics of the Derived ADES Normative Sample*

Characteristic		
<hr/>		
Age, <i>M (SD)</i>		15.23 (1.89)
Gender, <i>n (%)</i>		
	Male	721 (50.38)
	Female	710 (49.62)
Language background, <i>n (%)</i>		
	English	1054 (73.65)
	Other	377 (26.35)
<hr/>		

When considering the required size of a normative sample, Churchill (1979) states that “the larger the number of cases, the more stable will be the norms and the more definitive will be the conclusions that can be drawn, if the sample is representative of the total group the norms are to represent” (p. 72). The size of the current derived normative sample well exceeded the recommended minimum of 85 participants per each relevant stratified cell required to produce stable means and standard deviations in normative test data (Piovesana & Senior, 2018). Further, goodness-of-fit tests (Table 36) indicated that the normative sample was similarly distributed to the general Australian adolescent population described in the 2016 Australian Bureau of Statistics census (Australian Bureau of Statistics, 2017a). Inspection of the Normal QQ Plots showed a close to normal distribution for both the ADES-D and ADES-E in the derived normative sample.

Table 36

*Chi-Squared Goodness-of-Fit Tests Comparing the Derived ADES Normative Sample with the 2016 Australian Bureau of Statistics Census Data for Australian Adolescents*

Characteristic	Normative Sample	Relevant ABS 2016 Census Data	Chi-Square GOF Test
Gender, <i>n</i> (%)			
Male	50.38	51.29	$\chi^2(1) = 0.47, p = .49$
Female	49.62	48.71	
Language background <i>n</i> (%)			
English	73.65	72.70	$\chi^2(1) = 0.68, p = .42$
Other	26.35	27.30	

### **7.3.2.2 Findings and outcomes**

Descriptive statistics for the normative sample examined by group (Table 37) revealed respectable-to-very-good internal reliability in individuals of all genders, ages, and language backgrounds for both subscales of the ADES.

Table 37

*Descriptive Statistics for the ADES Subscales in the Derived Normative Data Set, Stratified by Demographic Group*

		ADES-Eustress			ADES-Distress		
	<i>n</i>	<i>M</i> [95CI]	<i>SD</i>	Internal Reliability ( $\alpha$ )	<i>M</i> [95CI]	<i>SD</i>	Internal Reliability ( $\alpha$ )
Whole Sample							
	1431	10.90 [10.67-11.13]	4.45	.80	9.25 [8.97-9.53]	5.42	.87
Gender							
Male	721	11.13 [10.81-11.46]	4.49	.81	7.71 [7.34-8.08]	5.06	.86
Female	710	10.67 [10.34-10.99]	4.41	.82	10.82 [10.42-11.21]	5.32	.86
Age							
Early Adolescence	591	10.93 [10.57-11.29]	4.44	.82	8.27 [7.83-8.71]	5.44	.88
Mid Adolescence	652	10.76 [10.41-11.11]	4.58	.83	9.68 [9.27-10.09]	5.28	.86
Late Adolescence	188	11.31 [10.73-11.89]	4.04	.77	10.85 [10.09-11.60]	5.27	.87
Language Background							
English	1054	10.81 [10.54-11.09]	4.52	.83	9.31 [8.98-9.63]	5.44	.87
Other	377	11.15 [10.72-11.59]	4.27	.78	9.10 [8.56-9.64]	5.36	.87

*Note.* Early Adolescence = 12-14 years old, Mid-Adolescence = 15-17 years old, Late Adolescence = 18-20 years old

To further aid interpretation of ADES scores, percentile ranks were calculated.

Hays (1994) defines that “in any frequency distribution of numerical scores, the percentile rank of any specific value  $x$  is the percentage of the total cases that fall at or below  $x$  in value” (p. 194). For example, a scale score with a percentile rank of 50.00 falls at such a point that 50% of the normative population scored at or below that score. As raw ADES subscale scores are discrete integers, percentile ranks were computed as the cumulative frequency at each integer score (Barrett, 2011). As such, an individual receiving a score of 20 on either subscale axiomatically has a percentile rank of 100.00, as all of the normative population (i.e. 100%) must have scored at or below the maximum score. Additionally, as multivariate analysis of variance found statistically significant main effects on the ADES subscales for both gender ( $F(2, 1428) = 64.68, p < .001$ ; Wilks'  $\lambda = .92$ ; partial  $\eta^2 = .08$ ) and age ( $F(4, 2854) = 12.10, p < .001$ ; Wilks'  $\lambda = .97$ ; partial  $\eta^2 = .02$ )<sup>25</sup>, gender- and age-stratified percentile ranks were also calculated. Percentile ranks for the ADES subscale scores are displayed in Table 38 (ADES-D) and Table 39 (ADES-E).

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<sup>25</sup> No significant differences were found for Language Background,  $F(2, 1428) = 0.85, p = .43$ ; Wilks'  $\lambda = 1.00$ ; partial  $\eta^2 = .00$

Table 38

*Whole Sample and Gender- and Age Stratified Percentile Ranks for Distress Subscale**Scores of the ADES*

Raw Score	Whole Sample	<i>Gender Stratified</i>		<i>Age Stratified</i>		
		Male	Female	Early	Mid	Late
0	4.75	7.35	2.11	7.11	3.22	2.66
1	7.48	10.82	4.08	10.15	5.83	4.79
2	12.09	17.75	6.34	16.24	10.12	5.85
3	15.79	22.75	8.73	21.66	12.58	8.51
4	21.66	30.10	13.10	28.60	18.10	12.23
5	27.95	37.59	18.17	35.36	23.77	19.15
6	34.94	45.35	24.37	43.49	30.67	22.87
7	41.37	52.57	30.00	50.76	35.89	30.85
8	48.43	60.33	36.34	56.01	44.79	37.23
9	53.25	64.22	42.11	61.08	50.00	39.89
10	60.38	71.15	49.44	66.84	58.90	45.21
11	65.48	76.42	54.37	71.07	63.96	53.19
12	70.51	81.55	59.30	76.31	68.56	59.04
13	74.77	85.02	64.37	79.70	73.62	63.30
14	80.43	88.77	71.97	84.26	79.29	72.34
15	84.07	91.12	76.90	86.97	83.28	77.66
16	88.05	93.90	82.11	90.52	87.27	82.98
17	91.33	95.98	86.62	93.06	90.80	87.77
18	95.39	97.92	92.82	96.28	95.09	93.62
19	96.72	98.20	95.21	97.46	96.17	96.28
20	100.00	100.00	100.00	100.00	100.00	100.00

Table 39

*Whole Sample and Gender- and Age Stratified Percentile Ranks for Eustress Subscale**Scores of the ADES*

Raw Score	Whole Sample	<i>Gender Stratified</i>		<i>Age Stratified</i>		
		Male	Female	Early	Mid	Late
0	1.19	0.97	1.41	1.52	1.07	0.53
1	2.03	1.66	2.39	1.86	2.45	1.06
2	4.05	4.02	4.08	4.23	4.75	1.06
3	5.94	5.83	6.06	5.92	6.75	3.19
4	9.43	9.15	9.72	9.14	10.89	5.32
5	13.28	12.76	13.80	14.04	14.11	7.98
6	17.47	16.78	18.17	17.60	18.56	13.30
7	21.59	20.25	22.96	22.00	22.24	18.09
8	28.09	25.52	30.70	26.73	30.21	25.00
9	35.64	33.15	38.17	34.52	37.58	32.45
10	46.40	43.83	49.01	45.18	48.77	42.02
11	53.88	52.01	55.77	52.96	55.52	51.06
12	62.19	60.75	63.66	61.42	64.26	57.45
13	68.83	67.55	70.14	68.02	70.25	66.49
14	76.45	74.48	78.45	76.65	76.23	76.60
15	84.21	82.94	85.49	84.94	83.44	84.57
16	90.15	88.77	91.55	91.03	88.96	91.49
17	94.27	92.79	95.77	94.08	93.87	96.28
18	96.65	95.98	97.32	96.79	96.32	97.34
19	97.90	97.36	98.45	98.31	97.55	97.87
20	100.00	100.00	100.00	100.00	100.00	100.00

To enhance the clinical interpretability of ADES scores, descriptive qualitative banding labels were created based on the distribution of raw scores. Similar to the procedure used by the Psychological Corporation (2009) in creation of Pearson Clinical

Assessment achievement tests, bandings for each ADES subscale were selected such that the most extreme 5% of scores at either end of the distribution were placed in the 'Extremely Low/High' range, the next 20% placed in the 'Low/High' range, and the remaining 50% placed in the 'Average' range, see Table 40. Given the discrete nature of the scores, the 5%, 20%, and 50% splits were necessarily approximate.

Table 40

*Qualitative Descriptors for Raw ADES Scores*

Qualitative Descriptor	Statistical Description	Raw Scores	
		ADES-E	ADES-D
Extremely Low	< 5 <sup>th</sup> Percentile of the normative data	0-2	0
Low	5 <sup>th</sup> Percentile ≤ > 25 <sup>th</sup> Percentile of the normative data	3-7	1-4
Average	25 <sup>th</sup> Percentile ≤ > 75 <sup>th</sup> Percentile of the normative data	8-13	5-13
High	75 <sup>th</sup> Percentile ≤ > 95 <sup>th</sup> Percentile of the normative data	14-17	14-17
Extremely High	≥ 95 <sup>th</sup> Percentile of the normative data	18+	18+

The labels for each band were created with input from the SMEs consulted during the Review phase of scale development (see Section 6.1, p. 154) and from educational staff at the participating schools. As described previously (see Sections 5.1.1.4, p. 140, and 7.2.4.1.1, p. 217), the ADES is intended to be evaluative rather than prescriptive, being designed to describe the adolescent stress response. Likewise, the qualitative descriptors were developed to aid meaningful interpretation and do not offer diagnostic criterion.

### **7.3.2.3 *Strengths and limitations of the normative data set***

Overall, the clinical utility and interpretability of the ADES was strengthened through the provision of large-scale normative data. Critically, goodness of fit tests indicated that the sample was broadly representative of the general Australian adolescent population in terms of key sociodemographic characteristics. However, limitations of the normative data set must also be considered. Firstly, considering the demographic makeup of the normative sample, data was not collected regarding participant's socio-economic status or ethnicity. It is thus unknown how the normative sample compares to the general population on these variables. Secondly, sampling was non-random, being restricted to participating educational institutions. As such, adolescents in the workforce, vocational training, and those unengaged in any formal system were overlooked. Further, given pragmatic difficulties relating to collection of data from government schools<sup>26</sup>, 62.75% of the sample were recruited from independent private schools, well above the national enrolment rate of 34.4% (Australian Bureau of Statistics, 2017b). As with the scale overall, test administrators should consider how their specific situation differs from the current context, how these differences may affect the validity and/or the utility of the normative data, and the implications of this on conclusions made using the scale (DeVellis, 2012).

### **7.3.3 *Production of a Manual for the Adolescent Distress-Eustress Scale***

In addition to dissemination of the ADES via publication in an academic journal, a scale manual was produced. The aim of the manual was to encapsulate the most practically relevant material relating to the development, administration, and

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<sup>26</sup> At the time of writing, data collection in public government schools required an extensive and lengthy application process through both the University of Adelaide's internal Human Research Ethics Subcommittee and the South Australian Department for Education Research Unit



interpretation of the ADES in an accessible and user-friendly format. The manual (Appendix J), includes a copy of the ADES, an explanation of the partial-consensus definition of stress underpinning the scale, administration and scoring instructions, a brief summary of the scale's psychometric properties, and relevant interpretative information including the percentile ranks and qualitative descriptors. Additionally, an interactive Excel workbook was created to aid scoring and interpretation. Using this file, test administrators enter the respondent's name, gender, and raw ADES responses, then using an array of protected 'Nested IF' and 'VLOOKUP' formulae a personalised, interpretive report of the participants' ADES scores is produced. The report includes individual item scores, total subscale scores, a visual representation of the subscale scores according to the qualitative descriptor bandings, and a short interpretative paragraph using percentile ranks. Figure 21 shows the data-input screen available to test administrators and Figure 22 provided an example of the output created using the workbook. This interactive workbook aimed to simplify the interpretative process, allowing those less familiar with administering psychological questionnaires (e.g. educational staff) to more effectively use the scale. A copy of the scale manual and report writing worksheet were made available to relevant stakeholders, including key members of staff at all participating schools.

	A	B	C	D	E	F
1						
2	<b>Instructions:</b> Enter participant name and gender (Male/Female/Other) in the cells below					
3						
4		<b>Name</b>				
5		<b>Gender</b>				
6						
7	<b>Instructions:</b> Transfer the participant responses for each item to the cells below, marking their response with an X					
8						
9		<b>Not Like Me</b>		<b>Somewhat like me</b>		<b>Very much like me</b>
10	I felt motivated.					
11	My mind was racing out of control.					
12	I felt the outcome was worth the effort.					
13	I was satisfied with how I dealt with the pressure.					
14	I felt panicked.					
15	I felt overwhelmed.					
16	I felt anxious.					
17	I felt determined.					
18	I felt proud for dealing with the pressure.					
19	I was frustrated with myself.					
20						
21	<b>Instructions:</b> For a copy of the participant's report, please click on the 'Report' tab					
22						
23						
24						
25						
26						
27						

READY

Scoring Report

Figure 21. Data-input screen of the ADES scoring and report writing interactive Excel workbook.

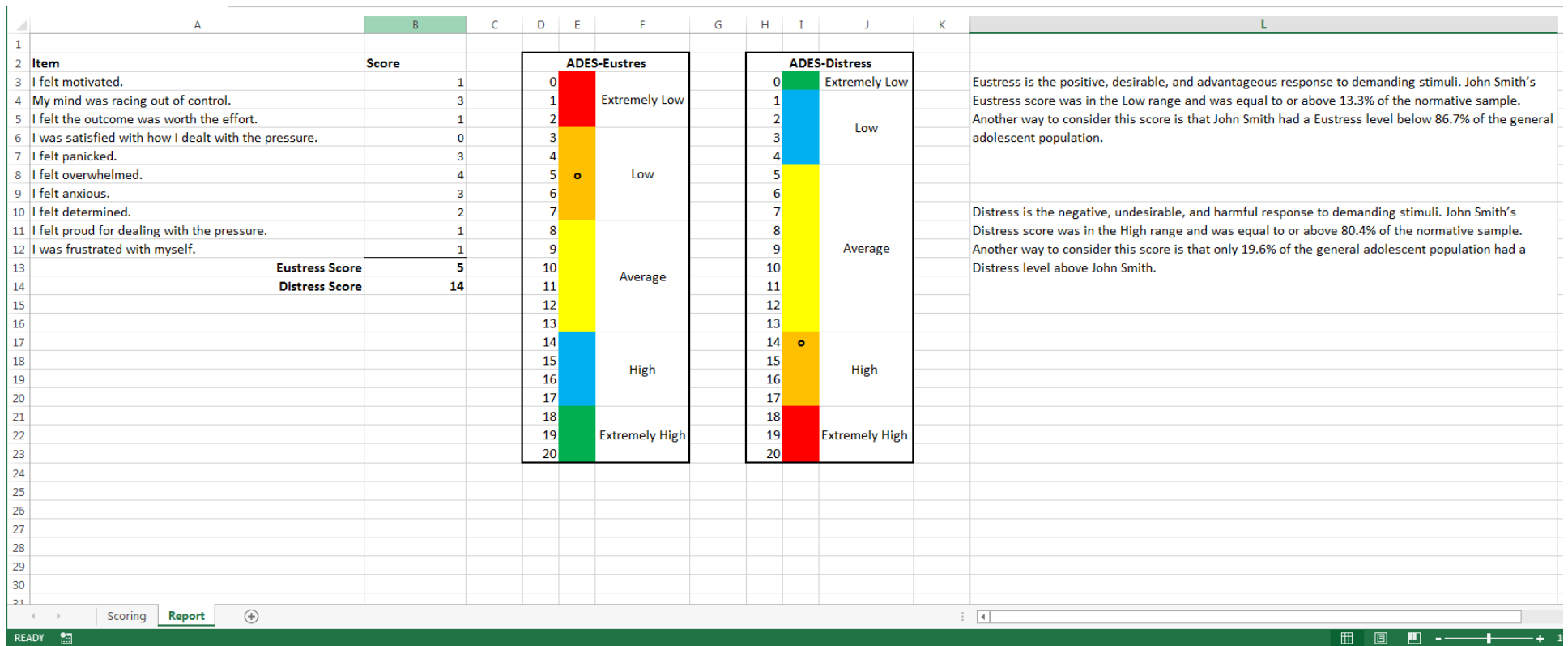


Figure 22. Example of output created by the ADES scoring and report writing interactive Excel workbook.

## **CHAPTER 8. A HOLISTIC UNDERSTANDING OF THE EFFECT OF STRESS ON ADOLESCENT WELLBEING**

Chapter 8 presents the results from Paper 3, which aimed to use the newly developed ADES to investigate the mechanisms and boundary conditions through which distress and eustress differentially effect adolescent wellbeing. Considering the overall thesis aim of scale development, this study sought to provide evidence for the criterion-related validity of the ADES by demonstrating that it predicts scores on conceptually-related measures (DeVellis, 2012). From a broader perspective, the paper aimed to provide a balanced, holistic understanding of the impact of stress on adolescent psychological health, counteracting the traditional negative research bias. In the first section of this chapter, an account of the theoretical background and operationalisation of adolescent wellbeing is provided. Next, a justification is provided for the use of Conditional Process Analysis (CPA) in investigating the relationships between stress and wellbeing. The study sample and resultant statistical power is also described. Finally, Paper 3 is presented as published in the journal *Stress and Health*.

### **8.1 Theoretical Background: Paper 3**

#### **8.1.1 Defining Wellbeing**

Despite vast research on the topic, there is no universally agreed upon definition of wellbeing (e.g. Huppert & So, 2013). The resulting diversity of definitions has led the literature to be confused and contradictory (Dodge, Daly, Huyton, & Sanders, 2012; Forgeard, Jayawickreme, Kern, & Seligman, 2011). In general, definitions of wellbeing are influenced by two philosophical perspectives: the hedonic approach highlights positive emotions, happiness, and life satisfaction, while the eudaimonic approach focusses on psychological functioning, meaning, and purpose (e.g. Dodge et al., 2012). Unifying these

two philosophical perspectives, wellbeing is often broadly defined as the combination of feeling good and functioning well (Huppert & So, 2013).

Psychometric research on positive mental health is limited and the best way to measure wellbeing is disputed (Hone, Jarden, Schofield, & Duncan, 2014). As such, when selecting a measure of adolescent wellbeing for use in Paper 3, extant literature was reviewed to establish the most appropriate operational model (e.g. Hone et al., 2014; Huppert & So, 2013; Kern et al., 2016). Broadly, existing models are separated into objective and subjective approaches (see for summary Forgeard et al., 2011). Objective measures, which seek to capture wellbeing using lists of objective indicators such as education and health, are largely criticised in the literature for lacking satisfactory validity and accuracy and are thus relatively uncommon (e.g. Forgeard et al., 2011). Relevant subjective models of wellbeing are therefore reviewed below.

### **8.1.2 Subjective models of wellbeing**

Subjective models of wellbeing focus on cognitive, affective, and relational aspects of the construct (Forgeard et al., 2011). While past research has used a single construct measures of happiness as a straightforward and intuitively appealing operationalisation of wellbeing, there is growing consensus that the construct is best understood to be multifaceted (e.g. Forgeard et al., 2011; Hone et al., 2014; Lyubomirsky et al., 2005). Furthermore, from a practical perspective, separating wellbeing into theoretically based factors allows for more targeted intervention approaches (Huppert & So, 2013; Kern et al., 2016).

Numerous multifaceted subjective models of wellbeing have been proposed in the literature, each conceptualising wellbeing in terms of different domains; key influential models are summarised in Table 41.

Table 41

*Summary of the Domains of Wellbeing Proposed by Influential Subjective Models*

Subjective Wellbeing Model (e.g. Diener, Suh, Lucas, & Smith, 1999)	Ryff and Keyes (1995) Model	Ryan and Deci (2000) Model	Diener et al. (2010) Model	Scales, Benson, Leffert, and Blyth (2010) Model	Huppert and So (2013) Model
<i>Wellbeing consists of three components:</i>	<i>Emotional, psychological, and social wellbeing consists of:</i>	<i>Wellbeing is the fulfilment of three basic psychological needs:</i>	<i>Flourishing assessed across elements of psychological success:</i>	<i>Adolescent thriving indicated by:</i>	<i>Flourishing consists of components:</i>
High Positive Affect	Autonomy	Autonomy	Engagement	School success	Competence
Low Negative Affect	Environmental mastery	Relatedness	Purpose/Meaning	Leadership	Emotional stability
High Life Satisfaction	Personal growth Personal relations with others Purposed in life Self-acceptance	Competence	Social Contribution Competence  Self-respect Positive relationships Optimism  Social Relationships	Helping others Maintenance of physical health Delay of gratification Valuing diversity Overcoming adversity	Engagement Meaning  Optimism Positive emotion Positive relationships Resilience Self-esteem Vitality

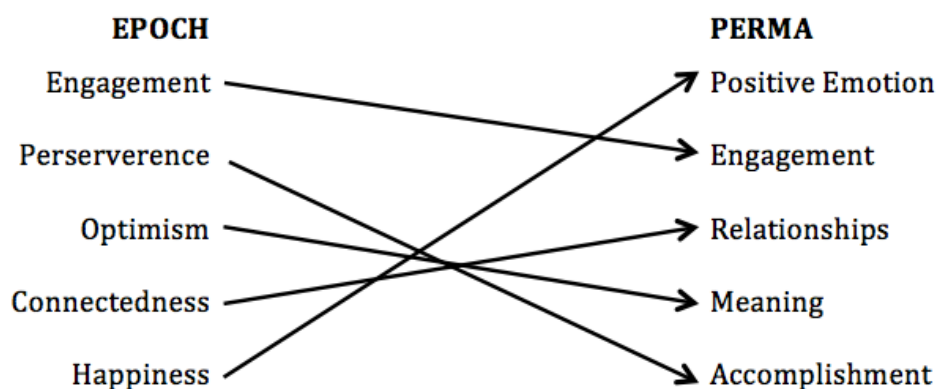
There is a varying level of empirical support for each of the subjective conceptualisations included in Table 41, with the reader directed to Hone et al. (2014) for a succinct review.

The other key subjective model of wellbeing is Martin Seligman's (2011) PERMA Theory, described in detail below.

#### **8.1.2.1 PERMA model of wellbeing**

Since Seligman popularised Positive Psychology in the late 1990s, he has proposed two models of wellbeing. In the first model (see Duckworth et al., 2005; Seligman, 2002), 'happiness' is defined as consisting of 3 elements: 1) Pleasant Life: Positive emotion about the past, present, and future. Maximising positive emotion and minimising negative emotion; 2) Engaged Life: Using one's strengths and talents to meet challenges, the outcome of which is flow; and 3) Meaningful Life: Using one's strengths to belong to/serve something larger than the self. Seligman's second model (e.g. 2011) represented a revised and more sophisticated expansion of the original model. In the updated theory, he defined 'flourishing' in terms of five elements: Positive Emotion, Engagement, Relationships, Meaning, and Accomplishment (known as PERMA). Each PERMA element contributes to, but does not define wellbeing, and is pursued for its own sake. Positive Emotion refers to subjective feelings of happiness and life satisfaction. Engagement refers to psychological connection to activities, characterised by intense concentration and flow. Relationships refers to being socially integrated and feeling connected to caring and supportive others. Meaning is believing that one's life is valuable and purposeful. Finally, Accomplishment is an individual's pursuit of mastery and achievement. These elements are interrelated but are considered separate and independent. Seligman's models both suitably capture core theory regarding wellbeing, representing both the hedonic and eudemonic perspectives.

In 2016, Kern et al. revised the PERMA model to ensure its appropriateness for adolescents. The modified model comprises of five factors: Engagement, Perseverance, Optimism, Connectedness, and Happiness (known as EPOCH). Engagement refers to interest in and capacity to become absorbed by life activities and tasks. Perseverance is the facility to pursue goals to completion, even when facing difficulties. Optimism is the tendency to take a confident and hopeful view of life. Connectedness is the sense one is cared for, loved, and esteemed in supportive, satisfying relationships. Finally, Happiness refers to a steady state of positive mood. The EPOCH elements were proposed to support adult flourishing, influencing the development of PERMA in adulthood. Figure 23 shows the theoretical fit between the EPOCH and PERMA models.



*Figure 23.* The adolescent EPOCH model of wellbeing mapped on to the adults PERMA model.

Critics of the PERMA/EPOCH approach argue it is descriptive but not predictive (Conway, 2012), biased towards Western cultures (e.g. Held, 2004), and lacks sufficient empirical support (Hone et al., 2014). Despite these criticisms, the models have gained traction in the wellbeing discourse due to their clarity, simplicity, brevity, and growing empirical evidence base (Hone et al., 2014; Kern et al., 2016). Considering these strengths, the South Australian Department for Education utilises the EPOCH model to collect yearly wellbeing data from every school student aged between 9 and 14. In light



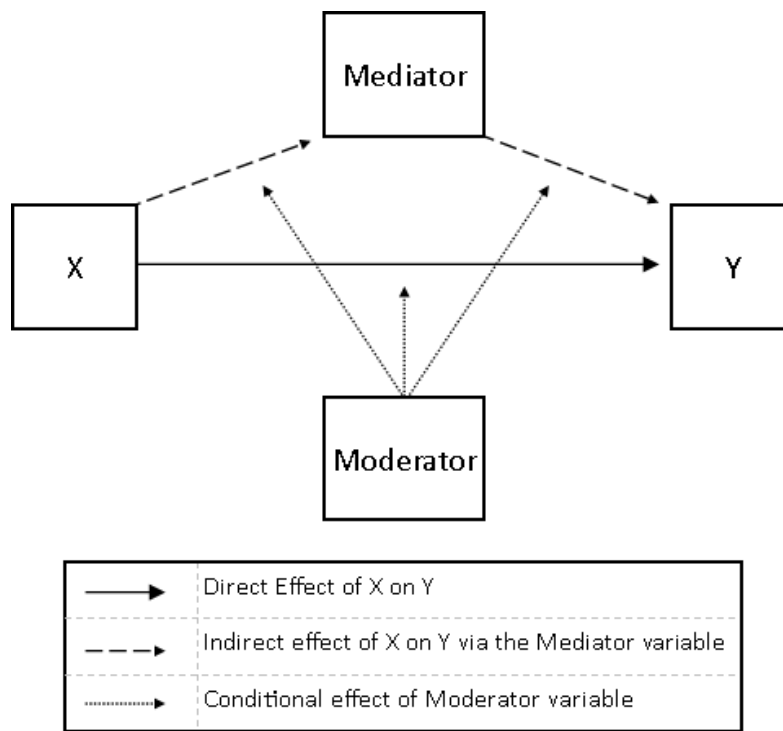
of this, Kern et al.'s (2016) EPOCH Measure of Adolescent Wellbeing was chosen to operationalise wellbeing in Paper 3.

## **8.2 Methodology: Paper 3**

Associations between psychological variables are rarely as simple as bivariate relationships (Fairchild & MacKinnon, 2009); as outlined by A. F. Hayes (2017a), “we better understand some phenomenon when we can answer not only whether X affects Y, but also how X exerts its effect on Y, and when X affects Y” (p. 6). Therefore, in Paper 3 other factors influencing the relationship between stress and wellbeing were considered. CPA which integrates mediation and moderation analytic techniques, was used to quantify the conditional nature of the mechanisms through which distress and eustress transmitted their effects to the wellbeing.

### **8.2.1 Conditional Process Analysis**

Mediation examines the mechanisms through which an independent variable X affects the outcome variable Y (i.e. *how* X affects Y), while moderation considers the boundary conditions of the association between the two variables (i.e. *when* X affects Y, A. F. Hayes, 2017a). Mediation and moderation are often treated as separate concepts, with distinct analytical procedures; however, CPA integrates the analyses by modelling the mechanisms linking two variables while concurrently allowing these effects to be moderated. A simple CPA model is shown in Figure 24.



*Figure 24.* A moderated-mediation conditional process model with a single moderator variable influencing the size and/or direction of X's direct and indirect effect on Y.

CPA was conducted using the PROCESS computational tool ('macro'; A. F. Hayes, 2017b), which utilises ordinary least squares (OLS) regression to estimate the conditional nature (moderation component) of the indirect and/or direct effects (mediation component) of X on Y in a causal system (A. F. Hayes, 2017a). Users select from preprogrammed CPA models or define new models via syntax and PROCESS estimates all relevant path coefficients, standard errors, and direct, indirect, and conditional effects. To investigate the relationships hypothesised in Paper 3, preprogrammed Model 59 was utilised (Figure 25). In addition to CPA, PROCESS can also be used to estimate basic moderation- and mediation-only models.

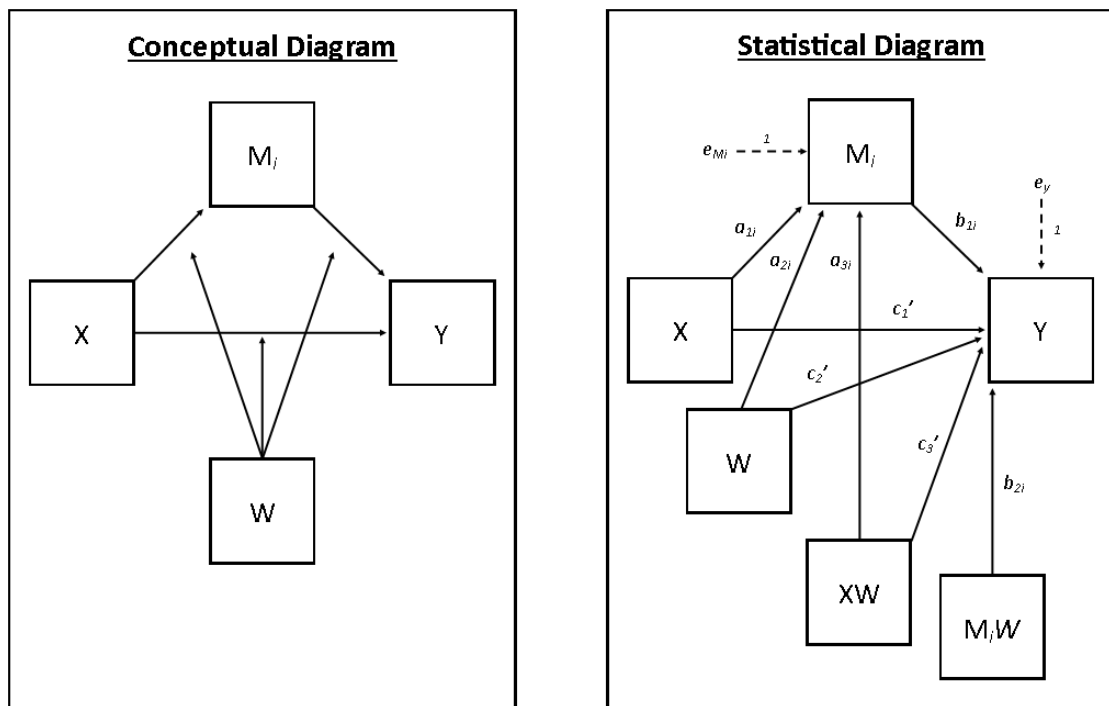


Figure 25. PROCESS model template 59 (adapted from A. F. Hayes, 2017a).

PROCESS automatically calculates statistics for inference about indirect effects including the Index of Moderated Mediation, which “quantifies the relationship between a proposed moderator and the indirect effect of  $X$  on  $Y$  through [a mediating variable]<sup>27</sup>” (A. F. Hayes, 2015, p. 15). If the Index is significant, this suggests that the indirect effect is contingent on the moderator and thus that the mediation is moderated (A. F. Hayes, 2015, 2017a). In this case, follow-up analysis estimates  $X$ ’s effect on  $Y$  at specific values of the moderator, known as ‘probing the interaction’ (A. F. Hayes, 2017a).

As many of the statistics estimated in PROCESS have irregular sampling distributions, the macro employs bootstrapping methods to allow for statistical inference. A. F. Hayes (2017a) recommends bootstrapping of estimates in 50,000 samples, with an effect considered significant if the resultant 95% confidence interval does not include zero.

<sup>27</sup> For a dichotomous moderator, the Index is calculated as the pairwise contrast between conditional indirect effects.

### **8.2.1.1 *Justification for use of conditional process analysis over structural equation modelling***

PROCESS is a contemporary analytic technique (A. F. Hayes, 2017a), with continuing discussion in the literature as to its strengths and weaknesses. In particular, critics argue that as models become more complex, maximum likelihood-based structural equation modelling (SEM) is more appropriate (e.g. Iacobucci, Saldanha, & Deng, 2007). The major criticism of PROCESS approach is that OLS regression is susceptible to random measurement error, which biases the estimation of effects (A. F. Hayes, Montoya, & Rockwood, 2017). The degree of this bias is variable and depends on factors such as the extent of unreliability in measurement and the complexity of the model. SEM approaches using latent variable models are suggested to be better able to deal with random measurement error, thereby reducing bias in the estimation of effects in CPA (A. F. Hayes, 2017a; A. F. Hayes et al., 2017; Iacobucci et al., 2007). However, A. F. Hayes et al. (2017) argue that this criticism of the PROCESS approach applies equally to all regression-based analyses and if one criticises OLS regression approaches to CPA, then one:

...should doubt the legitimacy of *any* analysis that can be expressed in the form of a linear regression model ... This would include regression analysis itself, analysis of variance and analysis of covariance, the independent group t-test, and even hypothesis tests involving the simple correlation between two variables. (p. 80)

A. F. Hayes et al. (2017) further argue that the proper estimation of interactions between latent variable SEM models remains highly controversial, meaning analysis of moderation effects using SEM can vary according to the differing assumptions used (A. F. Hayes et al., 2017; Marsh, Wen, & Hau, 2013).

Pragmatically, SEM is argued to allow for greater flexibility and control over the configuration of the model and estimation method and more options for dealing with

missing data (A. F. Hayes, 2017a; A. F. Hayes et al., 2017). However, SEM programs require greater programming skill and interpretative effort than PROCESS, constraining their accessibility. Further disadvantaging SEM, as the maximum likelihood estimation employed is based on large sample asymptotic theory, standard errors tend to be biased in small samples (A. F. Hayes et al., 2017). This means that substantially large sample sizes are required for robust SEM. Indeed, *a priori* sample size calculations (Soper, 2018; Westland, 2010) suggested that for the required SEM for the mediation-only analysis in Paper 3<sup>28</sup> a minimum sample size of 43,681 would be required to detect a small effect size (80% power,  $\alpha \leq 0.05$ ). Contrastingly, to conduct the same analysis using OLS regression in PROCESS, a sample size of only 668 is required to detect a small effect size (Faul et al., 2014).

Despite the theoretical and statistical debate around the merits of taking an OLS regression or SEM approach to CPA, empirical evidence suggests that for observed variable models the differences in the results are trivial and rarely influence the conclusions made (A. F. Hayes et al., 2017). As such, the PROCESS approach was selected with consideration of its pragmatic advantages and smaller required sample size.

#### **8.2.1.2 *The use of cross-sectional data in conditional process analysis***

For the current thesis, ethical considerations precluded the collection of longitudinal or experimental data, with the attachment of identifiers to adolescent participant responses prohibited for confidentiality reasons. As such, data collection was necessarily cross-sectional, constraining statistical interpretation of results to covariation between variables at one time point. However, mediation analysis is an inherently causal model, assuming a specific ordering of effects whereby the independent variable

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<sup>28</sup> Consisting of 6 latent construct variables, 73 observed scale items, and the observed gender variable

produces change in the mediating variable, which consequently elicits change in the outcome variable. As such, some researchers argue mediation analysis should not be conducted with cross-sectional data (e.g. Iacobucci et al., 2007; Maxwell & Cole, 2007).

Acknowledging this debate, A. F. Hayes (2017a) argues that inferences of causality are not a product of statistical analysis but of interpreting results within the context of theory, previous empirical research, and logic. Considering real-world constraints such as those encountered in the current research, meaningful results can therefore be gained from cross-sectional CPA. Such analysis is crucial in determining whether variables relate with each other as would be expected if mediation did exist and therefore demonstrating that data are consistent with hypothesised causal ordering. Iacobucci et al. (2007) suggest that in such cases, “the researcher bears the burden of arguing the ordered relationship on logical or theoretical grounds” (p. 140). In practice, researchers commonly use cross-sectional data to publish useful and meaningful mediation analysis (e.g. Broman-Fulks, Abraham, Thomas, Canu, & Nieman, 2018).

### **8.2.2 Paper 3 Sample and Power Analysis**

Participants were recruited from BHS, Pembroke School, The University of Adelaide, and USC (see Section 2.3.3.2, p. 67). A total of 1,089 students accessed the survey, with 1,018 providing valid responses; the listwise sample size was 919. Given the questionnaire was administered to a fixed sample, post hoc sensitivity analysis was undertaken using the Gpower computer program (Faul et al., 2014). For the gender-moderated, parallel mediation models, testing eleven predictors<sup>29</sup> in a linear multiple regression model with a listwise sample size of 919 and 80% power, a small effect size ( $f^2$

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<sup>29</sup> 1 predictor, 1 dichotomous moderating variable (male: 0, female: 1), 4 mediating variables, 5 interaction effects

= 0.02) would be detected at  $\alpha \leq .05$ . For the gender-controlled, parallel mediation-only models, testing six predictors<sup>30</sup> in a linear multiple regression model with a listwise sample size of 919 and 80% power, a small effect size ( $f^2 = 0.01$ ) would be detected at  $\alpha \leq .05$ .

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<sup>30</sup> 1 predictors, 4 mediating variables, 1 controlled covariate

### 8.3 Paper 3 - A holistic understanding of the effect of stress on adolescent wellbeing:

#### A conditional process analysis

Paper 3 is presented here in its manuscript format in manuscript format in the same typeset as the rest of the thesis. The published journal format appears as Appendix K. Content published as online supplemental material for the article appears in Appendix M.

#### Statement of Authorship

*Title of Paper:* A holistic understanding of the effect of stress on adolescent wellbeing: A conditional process analysis

*Publication status:* Published

*Publication details:* Branson, V., Palmer, E., Dry, M. J., & Turnbull, D. (2019). A holistic understanding of the effect of stress on adolescent well-being: A conditional process analysis. *Stress & Health, Advance online publication*. doi: 10.1002/smi.2896

#### Principal Author

*Name of Principal Author (Candidate):* Victoria Branson

*Contribution to the Paper:* Developed rationale for the study and devised aims and hypotheses. Planned and carried out data collection. Cleaned data and performed data analysis. Drafted, wrote, and submitted article, then revised and responded to reviewer comments. Acted as corresponding author.

*Overall Percentage (%):* 85%



*Certification:* This paper reports on original research I conducted during the period of my Higher Degree by Research candidature and is not subject to any obligations or contractual agreements with a third party that would constrain its inclusion in this thesis. I am the primary author of this paper.

*Signature:*

*Date:* 26 November 2019

### **Co-authors**

By signing the Statement of Authorship, each author certifies that:

- i. The candidate's stated contribution to the publication is accurate (as detailed above);
- ii. Permission is granted for the candidate to include the publication in the thesis; and
- iii. The sum of all co-author contributions is equal to 100% less the candidate's stated contribution.

*Name of Co-Author:* Associate Professor Edward Palmer

*Contribution to the Paper:* Supervised development of the work and advised on research design and planning. Provided guidance on the preparation of manuscript and editorial and structural feedback on the paper.

*Signature:*

*Date:* 26 November 2019

*Name of Co-Author:* Dr. Matthew J Dry

*Contribution to the Paper:* Supervised development of the work and advised on research design and planning. Oversight of statistics and modelling. Provided guidance on the preparation of manuscript and editorial and structural feedback on the paper.

*Signature:*

*Date:* 26 November 2019

*Name of Co-Author:* Professor Deborah Turnbull

*Contribution to the Paper:* Supervised development of the work and general oversight of design and implementation. Provided guidance on the preparation of manuscript and editorial and structural feedback on the paper.

*Signature:*

*Date:* 26 November 2019

### 8.3.1 Abstract

While traditional assumptions tend to conceptualise stress as inherently dysfunctional, psychological theory suggests it is not intrinsically maladaptive. Contemporary models emphasise that the stress response can be differentiated into both negative and positive aspects, known as distress and eustress. Research examining the differential effect of positive and negative stress on adolescent wellbeing is limited and has been hindered by a lack of appropriate measurement tools. The aim of the present study was to utilise the recently developed Adolescent Distress-Eustress Scale (ADES) to provide a balanced understanding of the impact of stress on positive mental health, holistically considering the effect of both distress and eustress on adolescent wellbeing. 1,081 Australian adolescents ( $M_{\text{age}} = 15.14$ , 54.03% female) completed an online survey comprising of the ADES alongside measures of wellbeing, self-efficacy, psychological illbeing, physical activity, and daytime sleepiness. Conditional Process Analysis suggested that distress exerted no direct influence on wellbeing, with the observed negative relationship fully mediated by psychological and behavioural variables. Contrastingly, eustress was both directly related to increased wellbeing and exerted an indirect effect through relationships with mediating variables. These results demonstrate that stress can have profoundly positive consequences. Theoretical contributions, implications for practice, and perspectives for future research are discussed.

### 8.3.2 Introduction

Adolescence is characterised by an accumulation of demanding events, with young people facing numerous physical, environmental, and psychological changes (e.g. Moksnes, Løhre, et al., 2014; Rudolph & Hammen, 1999). As such, adolescence can be a critically stressful period of the lifespan (Venning et al., 2013). Moreover, literature

suggests that the adolescent brain is particularly sensitive to the effects of stress (e.g. Lupien et al., 2009).

The underlying assumption of much existing research is that 'stress' is inherently dysfunctional, leading to profoundly negative psychological, behavioural, and physical consequences that can, at best, be mitigated by other factors (e.g. Aldwin & Stokols, 1988; F. Jones & Bright, 2001b). Based on this inference, there are numerous therapeutic programs designed for adolescents that seek to reduce stress as a method of increasing wellbeing (see for example: Felstead Education, 2019; Mental Health and Wellbeing Education and Training Providers, 2019). However, challenging this assumption, current theory suggests that stress is not intrinsically maladaptive and a growing body of empirical literature demonstrates that it can have desirable consequences (e.g. Boswell et al., 2004; Kozusznik et al., 2012). Interest in the positive aspect of stress has grown in the past two decades coinciding with the advent of Positive Psychology, which expands the traditionally deficit-focused approach of stress research to highlight positive human assets (e.g. Seligman & Csikszentmihalyi, 2000).

While theories differ in their specific conceptualisation of the stress process, influential contemporary models, such as the Holistic Stress Model (Nelson & Simmons, 2003) and the Transactional Approach (Lazarus & Folkman, 1984), emphasise that stress can be both positive and negative. Synthesising across models, the current study adopts a partial-consensus definition, where stress is defined as an individual's subjective response to a demanding stimulus, or 'stressor'. The resultant response, which is dependent upon individualised appraisal of the demand, can be differentiated into distress, the negative, undesirable, and harmful response to a stressor, and eustress, the positive, desirable, and advantageous response to a stressor. The two responses are

considered to be distinct constructs, rather than extremes on a continuum, suggesting individuals can simultaneously experience distress and eustress.

Responding to demanding stressors is theorised to differentially impact on adolescents' psychological, behavioural, and physical health. It is well established in the literature that distress is adverse for mental health. Extensive previous research has found that distress incites and worsens a number of factors incongruous with wellbeing, including negative thoughts and hopelessness (e.g. Hughes et al., 2011), exhaustion (e.g. Rice, 1999), alienation and withdrawal (e.g. Nelson & Simmons, 2003), and profoundly negative emotions (e.g. Parker & Ragsdale, 2015). In contrast, eustress has been found to elicit and promote factors conducive for improved wellbeing, such as motivation and improved cognitive and behavioural functioning (e.g. B. D. Edwards et al., 2014), focussed and enthusiastic engagement in activities (e.g. Nelson & Simmons, 2003), and far-reaching positive emotions (e.g. Parker & Ragsdale, 2015).

Empirically, several large cross-sectional studies of adults have found inverse relationships between the negative stress response and various aspects of wellbeing, including positive affect (Gloria, Faulk, & Steinhardt, 2013; Hargrove et al., 2014); psychological wellbeing (Glozah & Pevalin, 2014; Hargrove et al., 2014); happiness (Parker & Ragsdale, 2015); meaningfulness (Parker & Ragsdale, 2015); job satisfaction and commitment (e.g. Quinones et al., 2016); and engagement (Kozusznik et al., 2012). While the concept of 'positive stress' has received markedly less research interest, select cross-sectional studies report positive associations between eustress and quality of life (Babu et al., 2016); positive affect (J. C. Quick, Bennett, & Hargrove, 2014; Skinner & Brewer, 2002); psychological wellbeing (Hargrove et al., 2014); engagement (Kozusznik et al., 2012); job satisfaction and commitment (e.g. González-Morales & Neves, 2015); and optimism (e.g. Nelson & Simmons, 2003). Experimental studies additionally suggest that

participants manipulated to interpret stress positively experience greater positive emotion (Crum et al., 2017) and less emotional exhaustion (Strack & Esteves, 2015). Furthermore, a review concluded that eustress directly improved physiological functioning, rather than merely reducing harm (J. R. Edwards & Cooper, 1988).

As with much psychological literature, research into the effect of stress on positive psychological outcomes has been predominantly conducted in adult samples. Attempting to directly translate these results to adolescents discounts their unique developmental context (e.g. Compas, 1987b). Of the literature focussing on young people, cross-sectional results suggest negative associations between negatively-conceptualised 'stress' and both life satisfaction (Carboni & Gilman, 2012; Chappel et al., 2014; Newland et al., 2014; Noor & Alwi, 2013; O'Sullivan, 2011; Vera et al., 2012) and positive mental health (Anderson & Arnoult, 1989; Murdock et al., 2015). Additionally, a longitudinal diary study found that lower same-day distress predicted greater happiness (Kiang & Buchanan, 2014). Contrastingly, cross-sectional studies of urban, ethnic-minority adolescents found no unique relationship between distress and positive mental health constructs (Coyle & Vera, 2013; Vacek et al., 2010). Similarly, Kern et al. (2016) found only negligible, clinically-meaningless, negative correlations between distress and wellbeing. Only three studies could be located examining the effect of 'positive stress' on adolescents' psychological wellbeing. Of these studies, all of which were cross-sectional and focussed exclusively on undergraduate students aged 17 to 20 years, eustress was found to be weakly positively related to vigour, dedication (Mesurado et al., 2015), and life satisfaction (O'Sullivan, 2011). Contrastingly, Anderson and Arnoult (1989) found no significant relationship between positive stress and psychological health.

Overall, the differential relationship between stress and positive adolescent mental health constructs is under-researched and the existing results are varied.

However, considering the theoretical arguments and limited empirical evidence, the following primary hypotheses were formulated:

**Hypothesis 1a.** *Distress will be associated with decreased wellbeing*

**Hypothesis 1b.** *Eustress will be associated with increased wellbeing.*

### **8.3.2.1 Factors influencing the effect of stress on wellbeing**

As associations between variables are rarely as simple as bivariate relations, it is important to consider other factors influencing a relationship (e.g. Fairchild & MacKinnon, 2009; A. F. Hayes, 2017a). Currently, there is little to no literature investigating the potential mechanisms and boundary conditions through which distress and eustress differentially effect wellbeing. With such a limited evidence-base, the current study conjectures that gender, self-efficacy, psychological illbeing, daytime sleepiness, and physical activity may be expected to influence the stress-wellbeing relationship given their established causal associations with both constructs.

#### **8.3.2.1.1 Psychological factors**

Significant extant literature suggests that there are reciprocal causal influences between adolescent stress and both self-efficacy and illbeing. On one hand, if an individual responds positively to a stressor, their confidence in their ability to produce desired outcomes in the future is increased (Parker & Ragsdale, 2015; Quinones et al., 2016) and feelings of depression, anxiety, and general negative affect are decreased (e.g. Flook, 2011). In this way, eustress therefore promotes self-efficacy and decreases mental illbeing and vice versa for distress. Reciprocally, confident, self-efficacious individuals are more likely to perceive stressors positively and focus on the opportunities associated with a stressor (Cicognani, 2011; Luszczynska et al., 2011), thereby promoting the eustress response and decreasing the distress response. Similarly, individuals' with negative mood states are more likely to appraise stressors negatively than positively (e.g.

Flook, 2011). Empirically, distress is ubiquitously associated with increased negative affect, depression, and anxiety (e.g. Kiang & Buchanan, 2014; Moksnes, Løhre, et al., 2014), and has been found to share a weak, negative trend toward self-efficacy (Branson, Dry, Palmer, & Turnbull, 2019; O'Sullivan, 2011). While substantially less literature has examined the relationship between eustress and psychological variables, positively appraised stressors have been found to longitudinally predict decreased negative mood (Flook, 2011) and to share a positive relationship with self-efficacy (Mesurado et al., 2015; O'Sullivan, 2011).

Considering wellbeing, individuals with stronger self-efficacy and fewer symptoms of psychopathology and mental illbeing experience more positive psychological health (Lyubomirsky et al., 2005). Empirically, interventions that increase self-efficacy precipitate improved wellbeing (Gibbons et al., 2011) and cross-sectional studies of adolescents reveal positive associations between the two (Cicognani, 2011; Mesurado et al., 2015; O'Sullivan, 2011). With regard to illbeing, past psychological distress has been found to have a significant longitudinal effect on current wellbeing, but no support has been found for the reverse relationship (Lee & Oguzoglu, 2007), suggesting that while illbeing causally impacts on wellbeing, positive experiences are limited in their effect on psychological distress. Congruously, negative affect, depression, and anxiety are consistently associated with decreased wellbeing in cross-sectional studies of adolescents (e.g. Kern et al., 2016; Kiang & Buchanan, 2014; Vacek et al., 2010).

#### *8.3.2.1.2 Behavioural factors*

Overall, eustress is suggested to promote positive health behaviour while distress stimulates maladaptive behavioural responses (Glozah & Pevalin, 2014). Illustratively, stress differentially effects physical activity and sleep adequacy behaviours. Distress is associated with increased physiological arousal coupled with dysfunctional thoughts and



worries, which together are incompatible with high quality sleep (e.g. Sadeh, Keinan, & Daon, 2004). Consistently, distress has been found to be positively related to sleep disturbance in adolescents (Brand et al., 2014; Chung & Cheung, 2008). Additionally, distress is suggested to deplete an individual's energy resources, leading to subjective feelings of fatigue and tiredness (e.g. Parker & Ragsdale, 2015). Contrastingly, eustress has been argued to replenish energy resources, leading individuals to feel invigorated and energised (Parker & Ragsdale, 2015), states which seemingly preclude subjective feelings of sleepiness. Qualitatively, adolescents associate eustress with feelings of vitality and physical energy (Branson, Turnbull, et al., 2019). In addition, responding to stressors also influences individuals' efforts to be physically active (Stults-Kolehmainen & Sinha, 2014). Distress has a significantly deleterious effect on physical health and motivation levels, which impair efforts to engage in physical activity (Stults-Kolehmainen & Sinha, 2014). Contrastingly, eustress is associated with factors that promote engagement with physical activity, including increased enthusiasm, engagement, and motivation (e.g. Nelson & Simmons, 2003), as well as the above mentioned increases in physical energy. Empirically, adolescents experiencing greater distress have been found to be less physically active (Sevcikova et al., 2001), however, no research could be located examining the effect of eustress on physical activity levels.

Healthy lifestyle behaviours are reliably found to positively impact psychological wellbeing. Specifically, systematic reviews consistently conclude that physical activity is strongly associated with improvements in mental health across all age groups (Eime, Young, Harvey, Charity, & Payne, 2013; Salmon, 2001). While the primary mechanism for this positive relationship relates to exercise-induced stimulation of neurotransmitters (Parfitt, Pavey, & Rowlands, 2009), it is suggested that physical activity has added benefits for adolescents by encouraging socialisation and prosocial cooperative

relationships (e.g. S. J. Donaldson & Ronan, 2006; Eime et al., 2013). Furthermore, insufficient sleep and related fatigue have been found to negatively impact on adolescent wellbeing (e.g. Brand et al., 2014; Parker & Ragsdale, 2015).

**Hypothesis 2.** *Illbeing, self-efficacy, daytime sleepiness, physical activity will mediate the relationship between the two stress responses and wellbeing.*

**2a.** *i) Distress will be positively associated with illbeing and sleepiness and negatively associated with self-efficacy and physical activity. ii) Eustress will be negatively associated with illbeing and sleepiness and positively associated with self-efficacy and physical activity.*

**2b.** *i) Illbeing and daytime sleepiness will be negatively associated with wellbeing. ii) Self-efficacy and physical activity will be positively associated with wellbeing.*

#### 8.3.2.1.3 Gender

Literature suggests that the effect of stress on psychological and behavioural outcomes differs between genders (Compas, 1987b; Newland et al., 2014), with females both exposed to more stressors and experiencing greater emotional reactivity to those stressors than males (e.g. Rose & Rudolph, 2006; Rudolph & Hammen, 1999). Biologically, males and females evidence differing sex-related hormonal and neurobiological responses to environmental threat (Verma et al., 2011). In their seminal 2000 article, Taylor et al., argue these differences evolved by virtue of traditionally disparate investment in caring for offspring and family, with females responding to threat by seeking and nurturing social contact ('tend-and-befriend' response) while males respond by fleeing or aggressing ('fight-or-flight' response). As with other theories based in evolutionary psychology, this model has been significantly criticised for promoting biological determinism (e.g. Eagly & Wood, 2013). Addressing these criticisms, peer socialisation theories argue that the conventionally caring social roles of females require them to extend their concern to a wider range of people

(Almeida & Kessler, 1998). This is particularly relevant for the current population, as research suggests that divergent gender roles and associated differences in responsibilities, status, and power intensify and solidify during adolescence (Chandra-Mouli et al., 2017; World Health Organization, 2002). In a critical review of the literature, Rose and Rudolph (2006) conclude that observed differences are best understood as an interaction of biological propensity and psychosocial vulnerability. Empirically, longitudinal studies have found the relationships between stress and happiness (Kiang & Buchanan, 2014) and daily mood (Flook, 2011) are stronger for females than for males.

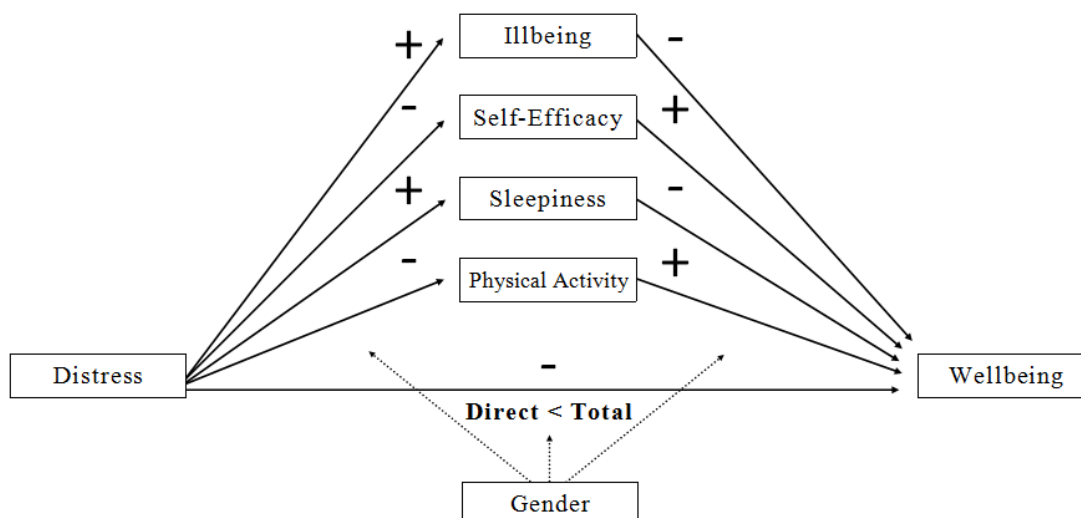
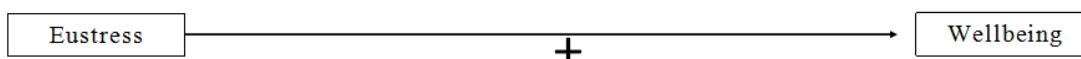
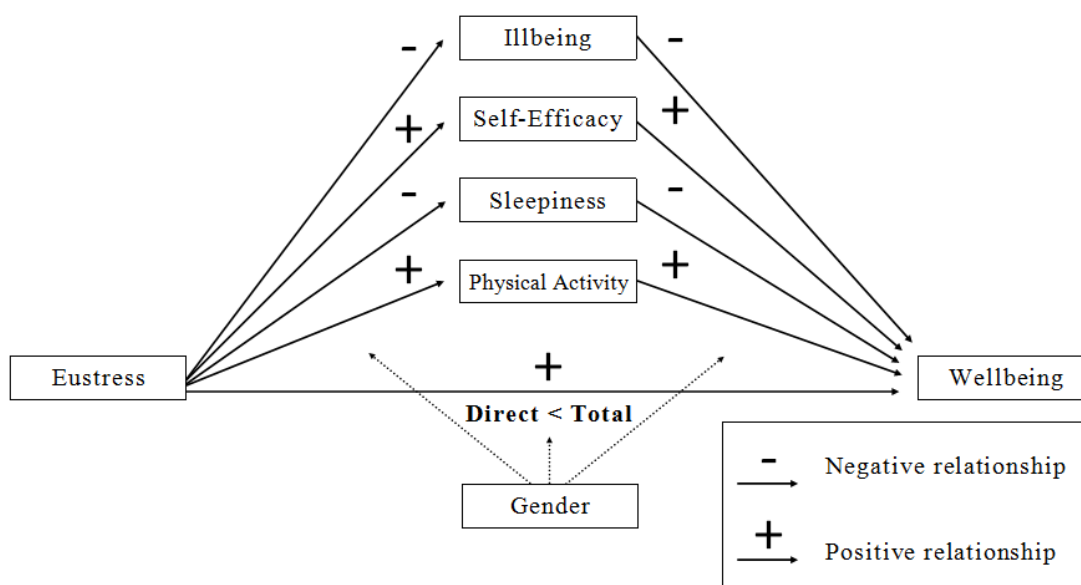
**Hypothesis 3.** *The direct and indirect relationships between the two stress responses and wellbeing will be stronger in adolescents identifying as female than as male.*

### **8.3.2.2 Aims of the present study**

Research into the differential effect of stress on adolescent wellbeing is limited and has been hindered by a lack of appropriate measurement tools. Despite prominent theoretical conceptualisations accepting eustress, the overwhelming majority of scales combine stress into a single-dimension and focus exclusively on what this paper defines as distress. As theory suggests there should be opposite effects for the two stress responses, using such scales masks the true relationship between stress and wellbeing (e.g. Cavanaugh et al., 2000). The present study aims to utilise the recently developed Adolescent Distress-Eustress Scale (Branson, Dry, et al., 2019) to holistically consider both distress and eustress, providing a balanced understanding of the impact of stress on adolescent psychological health.

The overarching goal of the current investigation was therefore to comprehensively examine the effect of stress on adolescent wellbeing, establishing the mechanisms and contingencies by which these relationships operate. Synthesising the

three hypotheses outlined above, Figure 26 summarises the predicted direct and indirect relationships between each stress response and wellbeing.

**1A) Distress Total Effect****1B) Distress Direct and Indirect Effects****2A) Eustress Total Effect****2B) Eustress Direct and Indirect Effects**

*Figure 26.* Overall conceptual diagrams for the hypothesised relationships between the adolescent stress responses and Wellbeing, as mediated by Illbeing, Self-Efficacy, Sleepiness, and Physical Activity, and moderated by Gender. *Note.* Gender was hypothesised to moderate all direct and indirect effects, however, the figure is simplified for clarity.

### 8.3.3 Method

#### 8.3.3.1 Participants and procedure

Students from four educational institutions of varying socio-educational advantage were invited to take part in an online questionnaire. A total of 1,089 students accessed the survey (46.38% response rate), with 1,018 providing valid data. Of those students completing the questionnaire, 70.43% attended an independent private school ( $n = 717$ ), 19.65% attended a publicly-funded government school ( $n = 200$ ), and 9.92% were undergraduate university students enrolled in first-year psychology courses ( $n = 101$ ). Participants' age ranged between 13 and 20<sup>31</sup> years, with a mean age of 15.14 ( $SD = 1.83$ ). Self-identified gender was reported as 54.03% female ( $n = 550$ ), 43.81% male ( $n = 446$ ), and 2.16% gender-diverse ( $n = 22$ ). The sample was predominantly English-speaking, with a significant minority (28%) speaking a language other than English at home.

Ethical considerations emphasised informed consent, anonymity, confidentiality, and safeguarding of participants' emotional wellbeing. All procedures were approved by the University of Adelaide School of Psychology: Human Research Ethics Subcommittee (Code: 18-06) and the Department of Education and Child Development (Reference: 2018-0020).

#### 8.3.3.2 Measures

##### 8.3.3.2.1 The Adolescent Distress-Eustress Scale (ADES)

The 10- item ADES (Branson, Dry, et al., 2019) consists of two subscales individually indexing distress and eustress. Each item (e.g. "I felt the outcome was worth the effort" and "I felt overwhelmed") is scored on a 5-point Likert-type scale, with

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<sup>31</sup> For the purposes of the current paper, 'adolescence' is defined as the ages 12-20, aligning with the South Australian Mental Health Survey (Venning et al., 2013). However, ethical considerations precluded the inclusion of 12 year olds in the current sample.

responses ranging from *Not like me* (0) to *Very much like me* (4). Subscale scores are computed separately, with greater sum scores indicating greater experience of the applicable stress response. The ADES subscales have demonstrated very good internal reliability (Distress  $\alpha = .87$ , Eustress  $\alpha = .83$ ) and evidence of construct validity in a large sample of young people (Branson, Dry, et al., 2019).

#### 8.3.3.2.2 *EPOCH Measure of Wellbeing*

Wellbeing, defined as the combination of feeling good and functioning well (e.g. Huppert & So, 2013), was operationalised using the Kern et al. (2016) EPOCH Model of Wellbeing. This model, which adapts Seligman's (e.g. 2011) seminal PERMA Model to ensure appropriateness for adolescents, delineates wellbeing into: 1) Engagement: interest in and capacity to be absorbed by life activities; 2) Perseverance: facility to pursue goals to completion; 3) Optimism: confident and hopeful perspective; 4) Connectedness: supportive, satisfying relationships; and 5) Happiness: positive mood. Using this framework, the 20-item EPOCH Measure of Wellbeing (Kern et al., 2016) provides an overall measure of adolescent wellbeing. Each item (e.g. "I feel happy" and "I am optimistic about the future") is scored on a 5-point Likert-type scale and subscale scores indexing the five wellbeing domains are computed as the average of the four corresponding items. Principal Component Analysis (PCA) was used to identify the latent variable 'Wellbeing' from the five EPOCH elements<sup>32</sup>, with total scores centred on 0 and higher scores indicating greater overall wellbeing. This scale has demonstrated good internal consistency in large samples of adolescents, with subscale Cronbach's  $\alpha$  values ranging from .75 to .87 (Kern et al., 2016).

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<sup>32</sup> See Appendix L for PCA results (not submitted as part of published paper; included here for clarity).

#### 8.3.3.2.3 DASS21

Illbeing<sup>33</sup> was operationalised using the Depression and Anxiety subscales of the 21-item DASS21 measure (Lovibond & Lovibond, 1995). Participants indicate the extent to which their experience corresponds with each statement (e.g. “I felt downhearted and blue” and “I felt scared without any good reason”) on a 4-point Likert-type scale, ranging from *Never* (0) to *Almost Always* (3) and sum scores are computed individually for Depression and Anxiety. PCA was used to identify the latent variable ‘Illbeing’, with total scores centred on 0 and higher scores indicating greater overall illbeing<sup>34</sup>. The DASS21 is considered valid for use in youths and demonstrated good internal consistency in a large representative sample of Australian adolescents (Depression  $\alpha = .88$ , Anxiety  $\alpha = .79$ ; Tully, Zajac, & Venning, 2009).

#### 8.3.3.2.4 The General Self-Efficacy Scale (GSES)

Self-Efficacy was operationalised using the GSES (Schwarzer & Jerusalem, 1995). Participants respond to each of the 10 items (e.g. “I can solve most problems if I invest the necessary effort”) on a 4-point Likert-type scale ranging from 1: *Not at all true* to 4: *Exactly true*, with a higher total sum score indicating greater overall perceived self-efficacy. The measure has demonstrated good internal reliability and evidence of validity in samples of young people (Schwarzer & Jerusalem, 1995).

#### 8.3.3.2.5 Cleveland Adolescent Sleepiness Questionnaire (CASQ)

The CASQ (Spilsbury et al., 2007) was used to measure subjective daytime sleepiness. Participants indicate on a 5-point Likert-type scale how often each statement

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<sup>33</sup> The term ‘illbeing’ is preferred over ‘mental illness’ as the DASS21 evaluates respondents’ negative emotional states along a continuum, rather than being categorical or diagnostic.

<sup>34</sup> See Appendix L for PCA results (not submitted as part of published paper; included here for clarity).



(e.g. “I fall asleep during my morning classes”) applies to them, with responses ranging from *Never* (1) to *Almost every day* (5). Greater overall sum scores indicate greater daytime sleepiness. The adolescent-specific scale has demonstrated good psychometric properties, including good internal reliability and validity (see Lewandowski, Toliver-Sokol, & Palermo, 2011 for review).

#### 8.3.3.2.6 *Physical Activity Questionnaire for Adolescents (PAQ-A)*

Physical activity was defined as “any bodily movement produced by skeletal muscles that requires energy expenditure” (World Health Organization, 2015, para. 1) and operationalised using the PAQ-A<sup>35</sup> (Kowalski, Crocker, & Donen, 2004). The PAQ-A captures activity levels in the previous week, with participants responding to the 9 items (e.g. “In the last 7 days, on how many evenings did you do sports, dance, or play games in which you were very active”) on a 5-point Likert-type scale. An overall summary score is calculated as the average of the first eight items, with higher scores indicating greater physical activity. The PAQ-A has demonstrated good psychometric properties, including good internal consistency and high convergent validity (e.g. Biddle, Gorely, Pearson, & Bull, 2011).

#### 8.3.3.3 *Data analysis*

Data were first screened for obviously frivolous responses (Fan et al., 2006) and outliers trimmed using the Hoaglin and Iglewicz (1987) labelling rule. Twenty-two participants identified as gender-diverse; the relatively small size of this group precluded meaningful inclusion in analysis and these data were therefore excluded and gender was treated dichotomously. To ensure appropriate models were utilised, mixed-model analysis was used to explore possible clustering in Wellbeing according to educational

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<sup>35</sup> Items were adapted to suit Australian participants, with approval from the measure’s author.

institution. After adjustment for age, there was no statistically significant difference in Wellbeing between the four participating institutions ( $F(3, 991) = 1.59, p = .19$ , partial  $\eta^2 = .01$ ) and as such, a single-level approach to analysis was taken. Preliminary analysis examined correlations among variables and gender differences in the data.

To test the hypothesised relationships (Figure 26), Conditional Process Analysis (CPA) was conducted using the SPSS PROCESS macro (A. F. Hayes, 2017b). CPA integrates mediation and moderation models to examine the conditional nature of the mechanisms through which the independent variable transmits its effects to the outcome variable (A. F. Hayes, 2017a). This regression-based, path-analytic approach uses bias corrected bootstrap confidence intervals to test the significance of both direct and indirect effects and the influence of moderating variables on these effects. For the current study, this involved conducting moderated parallel mediation analyses to examine if the strength and/or direction of the direct and indirect effects of the stress responses on Wellbeing differed between genders. As recommended by A. F. Hayes (2017a), when results indicated that gender was not a moderating factor, the model was modified and follow-up mediation-only analysis was conducted using PROCESS. Bootstrapping of regression estimates was conducted with 50,000 samples and a 95% confidence interval, with an effect considered significant when the confidence interval did not include zero.

### **8.3.4 Results**

#### **8.3.4.1 Preliminary analysis**

Correlation analysis (Table 42) revealed distress and eustress displayed an opposite pattern of relationships with the other variables. Distress shared a weak negative correlation with Wellbeing, sharing 10.12% variance. Eustress shared a moderate positive relationship with Wellbeing, sharing 41.85% variance.

Table 42

*Descriptive Statistics and Correlations of Eustress (1), Distress (2), Wellbeing (3), Illbeing (4), Self-Efficacy (5), Sleepiness (6), and Physical Activity (7)*

	1	2	3	4	5	6	7
1. Eustress	1	-.39	.65	-.47	.50	-.33	.23
2. Distress		1	-.32	.63	-.38	.32	-.22
3. Wellbeing			1	-.52	.60	-.34	.23
4. Illbeing				1	-.45	.46	-.19
5. Self-Efficacy					1	-.29	.14
6. Sleepiness						1	-.17
7. Physical Activity							1
Valid $N^a$	996	996	996	981	958	950	931
Cronbach's $\alpha$	.80	.88	.92	.92	.90	.87	.89
$M$	11.48	9.72	0.02 <sup>b</sup>	-0.01 <sup>b</sup>	29.80	37.69	2.50
$SD$	4.25	5.50	0.98	0.99	4.71	10.51	0.89

Note. All  $p$  values < .01.

<sup>a</sup>Cases excluded pairwise. <sup>b</sup>Mean scores for derived from PCA are not equal to zero due to the exclusion of gender-diverse participants

Examining gender differences, females exhibited lower scores on Eustress, Self-Efficacy, and Physical Activity and higher scores on Distress, Illbeing, and Sleepiness than males (Table 43). While no overall gender difference was found for total Wellbeing, Hotelling's  $T^2$  was run to determine the effect of gender on the individual EPOCH domains. The differences between genders on the combined dependent variables was statistically significant,  $F(5, 990) = 11.40, p < .001$ , Wilks'  $\lambda = .95$ , partial  $\eta^2 = .05$ . Post-hoc analysis (Bonferroni adjusted  $\alpha$  level of 0.01), showed females exhibited significantly higher scores on Connectedness than males (4.07 vs. 3.86 respectively,  $M_{\text{difference}} = 0.21$ , 95% CI [0.10, 0.32],  $p < .001$ ), with no other significant gender differences evident.

Table 43

*Independent t-tests for Gender Differences in Eustress, Distress, Wellbeing, Illbeing, Self-Efficacy, Sleepiness, and Physical Activity*

	Male		Female		$M_{\text{difference}}$	$t$	$d$
	Valid $n$	$M (SD)$	Valid $n$	$M (SD)$			
Eustress	446	11.97 (4.15)	550	11.09 (4.29)	0.88	3.29**	.21
Distress	446	7.94 (5.04)	550	11.16 (5.44)	-3.22	-9.70** <sup>a</sup>	.61
Wellbeing	446	0.02 (0.94)	550	0.02 (1.01)	-0.00	-0.04 <sup>a</sup>	.00
Illbeing	439	-0.22 (0.91)	542	0.16 (1.03)	-0.38	-6.14** <sup>a</sup>	.39
Self-Efficacy	431	30.55 (4.79)	527	29.18 (4.55)	1.37	4.54**	.30
Sleepiness	429	35.12 (10.22)	521	39.80 (10.29)	-4.68	-7.01**	.45
PA	421	2.70 (0.90)	510	2.33 (0.84)	0.37	6.44**	.42

Note. PA = Physical Activity.

<sup>a</sup>Welch t-test reported as Levene's Test for Equality of Variance > .05. \*\* $p < .01$

#### **8.3.4.2 Gender-moderated parallel mediation**

The moderated-mediation CPA results for the relationship between Distress and Wellbeing are provided in Table 44. Moderation of a direct effect is indicated when the interaction term created between the independent and moderator variable is a significant predictor of the outcome variable. As illustrated in Table 44, no interaction term significantly predicted any of the examined outcome variables, indicating that gender did not moderate any of the direct effects. Moderation of an indirect effect is indicated when the Index of Moderated Mediation is significant. Results showed that all Indices of Moderated Mediation were not significantly different from zero, suggesting that all indirect effects of Distress on Wellbeing were equivalent across males and females. Together, these results indicate that gender did not moderate either the direct or indirect effect of distress on wellbeing.

Table 44

*Conditional Process Analysis Results for the Relationship between Distress and Wellbeing, as Mediated by Illbeing, Self-Efficacy, Sleepiness, and Physical Activity, and Moderated by Gender Hypothesised relationships presented in Model 1B, Figure 26.*

Outcome		Illbeing			Self-Efficacy			Sleepiness			Physical Activity			Wellbeing		
		<i>b (SE)</i>	LCI	UCI	<i>b (SE)</i>	LCI	UCI	<i>b (SE)</i>	LCI	UCI	<i>b (SE)</i>	LCI	UCI	<i>b (SE)</i>	LCI	UCI
<b>Independent Variable</b>																
	Distress	<i>0.10 (0.01)</i>	<i>0.09</i>	<i>0.12</i>	<i>-0.36 (0.04)</i>	<i>-0.45</i>	<i>-0.28</i>	<i>0.50 (0.10)</i>	<i>0.60</i>	<i>0.69</i>	<i>-0.02 (0.01)</i>	<i>-0.04</i>	<i>-0.01</i>	<i>0.01 (0.01)</i>	<i>-0.01</i>	<i>0.02</i>
<b>Mediator Variables</b>																
	Illbeing													<i>-0.14 (0.04)</i>	<i>-0.22</i>	<i>-0.06</i>
	Self-Efficacy													<i>0.06 (0.01)</i>	<i>0.05</i>	<i>0.08</i>
	Sleepiness													<i>-0.00 (0.00)</i>	<i>-0.01</i>	<i>0.00</i>
	PA													<i>0.10 (0.04)</i>	<i>0.03</i>	<i>0.17</i>
<b>Moderator Variable</b>																
	Gender	<i>-0.16 (0.09)</i>	<i>-0.34</i>	<i>0.02</i>	<i>-1.09 (0.61)</i>	<i>-2.29</i>	<i>0.12</i>	<i>2.64 (1.40)</i>	<i>-0.13</i>	<i>5.41</i>	<i>-0.23 (0.12)</i>	<i>-0.46</i>	<i>-0.00</i>	<i>0.21 (0.48)</i>	<i>-0.74</i>	<i>1.15</i>
<b>Interaction Terms</b>																
	Distress x Gender	<i>0.02 (0.01)</i>	<i>-0.00</i>	<i>0.04</i>	<i>0.08 (0.06)</i>	<i>-0.04</i>	<i>0.19</i>	<i>0.05 (0.14)</i>	<i>-0.22</i>	<i>0.31</i>	<i>-0.01 (0.01)</i>	<i>-0.03</i>	<i>0.02</i>	<i>0.01 (0.01)</i>	<i>-0.01</i>	<i>0.03</i>
	Illbeing x Gender													<i>-0.07 (0.08)</i>	<i>-0.22</i>	<i>0.08</i>
	Self-Efficacy x Gender													<i>0.01 (0.01)</i>	<i>-0.01</i>	<i>0.04</i>
	Sleepiness x Gender													<i>-0.00 (0.01)</i>	<i>-0.01</i>	<i>0.01</i>
	PA x Gender													<i>-0.08 (0.05)</i>	<i>-0.18</i>	<i>0.03</i>
<b>Index of Moderated Mediation</b>																
	Distress → Illbeing → Wellbeing													<i>-0.01 (0.01)</i>	<i>-0.03</i>	<i>0.00</i>
	Distress → Self-Efficacy → Wellbeing													<i>0.00 (0.01)</i>	<i>-0.01</i>	<i>0.02</i>
	Distress → Sleepiness → Wellbeing													<i>-0.00 (0.00)</i>	<i>-0.01</i>	<i>0.00</i>
	Distress → PA → Wellbeing													<i>0.00 (0.00)</i>	<i>-0.00</i>	<i>0.01</i>

*Note.* Listwise  $N = 919$ . Significant results (i.e. the 95% Confidence Interval does not include zero) shown in italics.  $b$  = Unstandardised regression coefficient. SE = Standard Error. LCI = Lower bound of 95% confidence interval for  $b$ . UCI = Upper bound of 95% confidence interval for  $b$ . PA = Physical Activity.

The moderated-mediation CPA results for the relationship between Eustress and Wellbeing are provided in Table 45. Significant interaction terms indicated that the relationships between Eustress and both Illbeing and Physical Activity were moderated by gender. Separately estimating the regression coefficients for these relationships in the two gender groups indicated that the negative relationship between Eustress and Illbeing was stronger in females ( $b$  (SE) = -0.12, 95CI [-0.14, -0.10]) than in males ( $b$  (SE) = -0.08 (0.01), 95CI [-0.10, -0.06]). Conversely, the positive relationship between Eustress and Physical Activity was stronger for males ( $b$  (SE) = 0.06 (0.01), 95CI [0.04, 0.08]) than for females ( $b$  (SE) = 0.03 (0.01), 95CI [0.01, 0.05]). However the non-significant Indices of Moderated Mediation suggested that all indirect effect of Eustress on Wellbeing, including those transmitted via Illbeing and Physical Activity, were equivalent across genders. Additionally, the Eustress by Gender interaction term did not significantly predict Wellbeing, suggesting gender did not moderate the direct relationship between Eustress and Wellbeing. Together, these results indicate that while gender did moderate some effects of Eustress, it did not influence either its direct or indirect effect on Wellbeing.

Table 45

*Conditional Process Analysis Results for the Relationship between Eustress and Wellbeing, as Mediated by Illbeing, Self-Efficacy, Sleepiness, and Physical Activity, and Moderated by Gender Hypothesised relationships presented in Model 2B, Figure 26.*

Outcome		Illbeing			Self-Efficacy			Sleepiness			Physical Activity			Wellbeing		
		<i>b (SE)</i>	LCI	UCI	<i>b (SE)</i>	LCI	UCI	<i>b (SE)</i>	LCI	UCI	<i>b (SE)</i>	LCI	UCI	<i>b (SE)</i>	LCI	UCI
<b>Independent Variable</b>																
	Eustress	-0.08 (0.01)	-0.10	-0.06	0.51 (0.05)	0.41	0.61	-0.79 (0.12)	-1.03	-0.56	0.06 (0.01)	0.04	0.08	0.09 (0.01)	0.07	0.11
<b>Mediator Variables</b>																
	Illbeing													-0.22 (0.05)	-0.33	-0.12
	Self-Efficacy													0.09 (0.01)	0.07	0.10
	Sleepiness													-0.01 (0.00)	-0.02	-0.00
	PA													0.18 (0.04)	0.11	0.26
<b>Moderator Variable</b>																
	Gender	0.70 (0.18)	0.35	1.06	-1.84 (0.89)	-3.59	-0.09	4.01 (2.00)	0.14	7.96	0.01 (0.18)	-0.34	0.36	0.49 (0.39)	-0.29	1.26
<b>Interaction Terms</b>																
	Eustress x Gender	-0.04 (0.01)	-0.06	-0.01	0.08 (0.07)	-0.06	0.22	0.00 (0.16)	-0.31	0.30	-0.03 (0.01)	-0.06	-0.00	-0.00 (0.01)	-0.03	0.02
	Illbeing x Gender													0.01 (0.06)	-0.12	0.13
	Self-Efficacy x Gender													0.00 (0.01)	-0.02	0.03
	Sleepiness x Gender													-0.01 (0.00)	-0.02	0.00
	PA x Gender													-0.00 (0.05)	-0.10	0.10
<b>Index of Moderated Mediation</b>																
	Eustress → Illbeing → Wellbeing													0.00 (0.01)	-0.01	0.02
	Eustress → Self-Efficacy → Wellbeing													0.01 (0.01)	-0.01	0.02
	Eustress → Sleepiness → Wellbeing													0.01 (0.00)	-0.00	0.01
	Eustress → PA → Wellbeing													-0.00 (0.00)	-0.01	0.00

Note. Listwise  $N = 919$ . Significant results (i.e. the 95% Confidence Interval does not include zero) shown in italics.  $b$  = Unstandardised regression coefficient. SE = Standard Error. LCI = Lower bound of 95% confidence interval for  $b$ . UCI = Upper bound of 95% confidence interval for  $b$ . PA = Physical Activity.

Overall, the results of the Gender-Moderated Parallel Mediation provided no support for the hypotheses that the direct and indirect relationships between each of the two stress responses and Wellbeing would be stronger for females than for males.

#### **8.3.4.3 Gender-controlled parallel mediation**

As results indicated that gender did not moderate the relationship between either stress response and Wellbeing, follow-up parallel mediation-only analysis was conducted. Given observed gender differences for both the independent and mediator variables, gender was designated as a covariate.

Table 46 summarises results of the estimated parallel mediation model between Distress and Wellbeing. The Total Effects Model explained 10.40% of the variation in Wellbeing ( $F(2,916) = 53.16$ ,  $R^2 = 0.10$ ,  $p < .01$ ), with Distress sharing a negative relationship with the outcome. The addition of the mediating variables explained an additional 35.62% of variation in Wellbeing ( $F(6,912) = 129.56$ ,  $R^2 = 0.46$ ,  $p < .01$ ). The 95% confidence interval for the Total Indirect Effect of Distress on Wellbeing did not contain zero (95CI [-0.08, -0.06]), indicating the effect was statistically significant. However, the regression coefficient for the direct relationship between Distress and Wellbeing was not statistically significant (95CI [-0.00, 0.02]). As expected Distress was positively associated with Illbeing and Sleepiness and negatively associated with Self-Efficacy and Physical Activity, and these conditions were accordingly related to decreased Wellbeing. The indirect effects via illbeing and self-efficacy were relatively stronger than those through sleepiness and physical activity. Together, these results indicate that Distress did not share a direct relationship with the outcome, but was indirectly related to decreased Wellbeing through its relationships with Illbeing, Self-Efficacy, Sleepiness, and Physical Activity.



Table 46

*Total, Direct, and Indirect Effects of Distress on Wellbeing, as Mediated By Illbeing, Self-Efficacy, Sleepiness, and Physical Activity, and Controlling for Gender*

	<i>b</i> (SE)	LCI	UCI	$\beta$
Distress → Illbeing	0.11 (0.01)	0.10	0.12	0.63
Distress → Self-Efficacy	-0.32 (0.03)	-0.37	-0.26	-0.37
Distress → Sleepiness	0.52 (0.07)	0.39	0.65	0.27
Distress → Physical Activity	-0.03 (0.01)	-0.04	-0.01	-0.16
Illbeing → Wellbeing	-0.26 (0.04)	-0.34	-0.19	-0.27
Self-Efficacy → Wellbeing	0.09 (0.01)	0.08	0.11	0.46
Sleepiness → Wellbeing	-0.01 (0.00)	-0.02	-0.01	-0.12
Physical Activity → Wellbeing	0.15 (0.03)	0.09	0.20	0.14
Total Effect Distress → Wellbeing	-0.06 (0.01)	-0.07	-0.05	-0.34
Direct Effect Distress → Wellbeing	0.01 (0.01)	-0.00	0.02	0.06
Distress → Illbeing → Wellbeing	-0.03 (0.00)	-0.04	-0.02	-0.17
Distress → Self-Efficacy → Wellbeing	-0.03 (0.00)	-0.04	-0.02	-0.17
Distress → Sleepiness → Wellbeing	-0.01 (0.00)	-0.01	-0.00	-0.03
Distress → Physical Activity → Wellbeing	-0.00 (0.00)	-0.01	-0.00	-0.02
Total Indirect Effects Distress → Wellbeing	-0.07 (0.01)	-0.08	-0.06	-0.40

*Note.* Listwise  $N = 919$ .  $b$  = Unstandardised regression coefficient. SE = Standard Error.  $\beta$  = Standardised regression coefficient. LCI = Lower bound of 95% confidence interval for  $b$ . UCI = Upper bound of 95% confidence interval for  $b$ .

Table 47 summarises results of the estimated parallel mediation model between Eustress and Wellbeing. The Total Effects Model explained 41.88% of the variation in Wellbeing ( $F(2,916) = 330.00$ ,  $R^2 = 0.42$ ,  $p < .01$ ), with Eustress sharing a positive relationship with the outcome. The addition of the mediating variables explained an additional 13.85% of variation in Wellbeing ( $F(6,912) = 191.36$ ,  $R^2 = 0.56$ ,  $p < .01$ ). The regression coefficients for both the direct and total indirect relationship between

eustress and wellbeing were statistically significant. As expected Eustress was negatively associated with Illbeing and Sleepiness and positively associated with Self-Efficacy and physical activity, and these conditions were accordingly related to increased Wellbeing. The indirect effects via Illbeing and Self-Efficacy were relatively stronger than those through Sleepiness and physical activity. The direct effect accounted for 59.64% of the total effect. Together, these results indicate that increased Eustress was directly related to increased Wellbeing as well as exerting an indirect positive on the outcome through its relationships with Illbeing, Self-Efficacy, Sleepiness, and Physical Activity.

Table 47

*Total, Direct, and Indirect Effects of Eustress on Wellbeing, as Mediated by Illbeing, Self-Efficacy, Sleepiness, and Physical Activity, and Controlling for Gender*

	<i>b</i> (SE)	LCI	UCI	$\beta$
Eustress → Illbeing	-0.10 (0.01)	-0.12	-0.09	-0.45
Eustress → Self-Efficacy	0.56 (0.03)	0.49	0.62	0.49
Eustress → Sleepiness	-0.79 (0.08)	-0.94	-0.64	-0.31
Eustress → Physical Activity	0.04 (0.01)	0.03	0.06	0.19
Illbeing → Wellbeing	-0.14 (0.03)	-0.20	-0.08	-0.14
Self-Efficacy → Wellbeing	0.06 (0.01)	0.05	0.08	0.32
Sleepiness → Wellbeing	-0.01 (0.00)	-0.01	-0.00	-0.08
Physical Activity → Wellbeing	0.10 (0.02)	0.05	0.14	0.09
Total Effect Eustress → Wellbeing	0.15 (0.01)	0.14	0.16	0.65
Direct Effect Eustress → Wellbeing	0.09 (0.01)	0.08	0.10	0.39
Eustress → Illbeing → Wellbeing	0.01 (0.00)	0.01	0.02	0.06
Eustress → Self-Efficacy → Wellbeing	0.04 (0.00)	0.03	0.04	0.16
Eustress → Sleepiness → Wellbeing	0.01 (0.00)	0.00	0.01	0.02
Eustress → Physical Activity → Wellbeing	0.00 (0.00)	0.00	0.01	0.02
Total Indirect Effects Eustress → Wellbeing	0.06 (0.01)	0.05	0.07	0.26

*Note.* Listwise  $N = 919$ .  $b$  = Unstandardised regression coefficient. SE = Standard Error.  $\beta$  = Standardised regression coefficient. LCI = Lower bound of 95% confidence interval for  $b$ . UCI = Upper bound of 95% confidence interval for  $b$ .

### 8.3.5 Discussion

The present study represents the first holistic examination of effect of stress on adolescent wellbeing, extending prior research by utilising a recently developed two-dimensional measure to consider the impact of both distress and eustress. Utilising CPA, results work toward establishing the mechanisms and contingencies by which distress and eustress differentially impact on adolescent wellbeing.

Consistent with theoretical arguments and the limited empirical evidence (e.g. Kiang & Buchanan, 2014; Mesurado et al., 2015; Newland et al., 2014; O'Sullivan, 2011), distress shared a weak negative relationship with adolescent wellbeing while eustress shared a moderate positive relationship with the outcome. CPA results indicated that the relationship between distress and wellbeing was fully mediated by illbeing, sleepiness, self-efficacy, and physical activity, suggesting that decreased distress enhanced factors associated with positive mental health but did not exert a direct influence on the outcome. Contrastingly, increased eustress both created a context of wellbeing-enhancing psychological and behavioural factors and exerted a direct influence on adolescent wellbeing. Moreover, of all predicting variables, eustress exerted the strongest influence on wellbeing, with the direct relationship accounting to 59.64% of the total effect. Together, these results suggest that while distress and the psychological and behavioural mediating variables significantly impacted on the outcome, eustress was the most strongly influential factor contributing to adolescent wellbeing.

Current results did not support the prediction that the relationships between stress and wellbeing would be stronger for females than for males, with no evidence for gender moderation. While the present study is the first to explicitly investigate the moderating influence of gender on the relationships between distress, eustress, and wellbeing, these results are seemingly inconsistent with literature suggesting that adolescent girls are more sensitive to the effects of stress than boys (e.g. Flook, 2011; Kiang & Buchanan, 2014). However, while not found to be a moderating factor, large, clinically-meaningful gender differences were observed for the majority of examined variables, with females exhibiting lower scores on Eustress, Self-Efficacy, and Physical Activity, and higher scores on Distress, Illbeing, and Sleepiness than males. This is consistent with a large body of literature suggesting that adolescent females tend

towards poorer psychological and behavioural health, exhibiting greater negative reactivity to stressors (e.g. Rose & Rudolph, 2006; Rudolph & Hammen, 1999); higher rates of internalising problems (e.g. Lupien et al., 2009; Tully et al., 2009); reduced self-efficacy (e.g. Bergman & Scott, 2001; Frydenberg, 2011); lower participation in physical activity (e.g. Van Der Horst, Paw, Twisk, & Van Mechelen, 2007); and greater daytime sleepiness (e.g. Spilsbury et al., 2007). As discussed in the introduction, these differences are likely explained by a combination of biological factors and the psychosocial influence of differing gender roles (e.g. Rose & Rudolph, 2006).

Observed gender differences indicate females exhibited poorer scores on all variables associated with lowered wellbeing, however, results revealed no overall difference on total Wellbeing scores across genders. Several possible explanations are offered for this seemingly conflicting finding. Firstly, examining gender differences across the five constituent EPOCH wellbeing domains suggested that females' Total Wellbeing scores may have been biased upwards by significantly higher scores on Connectedness. Qualitatively, if Total Wellbeing scores were calculated excluding the Connectedness domain, female wellbeing scores would be meaningfully lower than males. These observed differences are cogent with literature suggesting that while females trend towards lower wellbeing domain scores, they receive higher levels of many emotional provisions in their friendships (e.g. closeness, trust, and nurturance; see Rose & Rudolph, 2006 for a review), and thus experience significantly higher Connectedness scores (Kern et al., 2016). This result may also be interpreted in relation to Taylor et al.'s (2000) 'Tend-and-Befriend' theory, which posits that females' response to threat is characterised by a pattern of affiliation with social groups. Perhaps in response to observed poorer psychological and behavioural health discussed above, females responded by nurturing supportive relationships and therefore had heightened Connectedness scores. Secondly,

the current study may have failed to include an important, gender-specific, protective variable. For example, it is commonly accepted that females are less prone to externalising behaviours, such as aggression, antisocial behaviour, and substance abuse, all of which are associated with decreased wellbeing (Rosenfield & Mouzon, 2013). Without a measure of externalising, the negative influence of such behaviours on male wellbeing may be unrecognised in the present study. Finally, research suggests that observed gender differences are often confounded by reporting bias, with boys less inclined to report negative emotions (Vacek et al., 2010). Teasing these issues apart offers perspectives for further research.

Overall, results challenge the common assumption that stress is inherently dysfunctional, demonstrating that stress can have desirable consequences for positive adolescent mental health. By holistically considering both distress and eustress, the present study contributes to theory by providing a balanced understanding of the differential effect of stress on adolescent's psychological health. Further, results offer implications for practice, discussed below.

#### **8.3.5.1 *Practical implications***

In addition to the intrinsic value of feeling good and functioning well, adolescent wellbeing is associated with numerous advantageous secondary outcomes, including social and academic success, improved physical health, and reduced mental illness and psychopathology (e.g. Huppert, 2009; Kern et al., 2016; Lyubomirsky et al., 2005). There are thus potentially far-reaching and broad-spectrum benefits in seeking to foster and enhance adolescent wellbeing through intervention. Importantly, focusing on wellbeing early in life is argued to “develop a young person’s psychological strengths and lay the foundations of a sustained healthy life in adulthood” (Venning et al., 2013, p. 34).

Understanding the accessible and modifiable causes of wellbeing in adolescents is fundamental in providing effective, evidence-based interventions.

Based on the common assumption that stress is intrinsically maladaptive, numerous therapeutic programs seek to reduce stress as a method of increasing adolescents' wellbeing (e.g. Felstead Education, 2019; Mental Health and Wellbeing Education and Training Providers, 2019). However, the current study provides a more nuanced reference on stress and therapeutic intervention for the improvement of adolescents' mental health. Results suggest that contrary to traditional assumptions, holistic stress management interventions are required that recognise that response to demands can be positive as well as negative (Nelson & Simmons, 2003). Moreover, given the relative strength of their impact on wellbeing, results suggest that while distress reduction is valuable, intervention should strongly focus on generating and reinforcing eustress.

In practice, professionals working with young people should acknowledge that stress is not always associated with unfavourable outcomes and aim to identify which aspects of life adolescents consider 'eustressful' and why and then seek to reinforce these elements (Hargrove et al., 2013; McGowan et al., 2006). Interventions that fail to differentiate between the dimensions of stress in this way may unintentionally remove the experience of stress that enhances wellbeing (Boswell et al., 2004). Additionally, while the present study found no evidence of a moderating effect of gender, female-specific interventions may be warranted on the basis that results indicated girls may be particularly vulnerable to poor psychological health during adolescence. Future research should seek to determine the mode and content of intervention that are most likely to reinforce and generate eustress in adolescents.

### **8.3.5.2 Strengths, limitations, and future directions**

The current study has severable notable strengths, including its novelty, comprehensive and detailed analysis procedure, and the use of a large, socio-educationally diverse sample. However, these findings should be interpreted with the following important considerations in mind.

Firstly, the cross-sectional design of the study constrains conclusions regarding causation. Mediation is a causal model that assumes the independent variable produces change in the mediating variable, which in turn leads to change in the outcome variable. Despite the extensive extant literature cited in the introduction establishing the theoretical and empirical argument for the causal links hypothesised, strict causal ordering cannot be statistically established using the current cross-sectional data. Acknowledging this constraint, A. F. Hayes (2017a) argues that cross-sectional CPA is crucial in determining whether variables relate with each other as would be expected if mediation did exist and therefore in demonstrating that data are consistent with hypothesised causal ordering. However, it will be important for future research to replicate and extend the results of the present study using longitudinal or experimental data.

Secondly, investigation of gender differences in the stress-wellbeing relationship was limited by the exclusion of gender-diverse participants. Qualitatively examining the descriptive statistics of the gender-diverse participants suggests they experienced poorer mental health than male or female participants, including substantially higher illbeing and lower wellbeing (see Appendix M<sup>36</sup>). These observations are consistent with a vast and growing body of literature suggesting that gender-diverse and transgender people

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<sup>36</sup> *Submitted as online supplemental material in the published paper*



are substantially more likely to experience mental health disorders and report suicidal and self-harm ideation (e.g. Hyde et al., 2014). Future research may look to consider the effect of stress on wellbeing in gender-diverse adolescents.

Finally, the current study was pragmatically bound in terms of the number of variables collected. The included psychological and behavioural factors were selected based on the strength of empirical and theoretical support for their relationships with stress and wellbeing as well as their clear potential importance. However, the literature suggests that further sophistication of the conditional process model could be achieved through consideration of the mediating influence of diet (Austin et al., 2009), social support (Glozah & Pevalin, 2014), and self-esteem (Lyubomirsky et al., 2005) and the moderating influence of personality (Huppert, 2009; Kung & Chan, 2014) and socioeconomic status (Huppert, 2009; Newland et al., 2014). Select research also suggests that the proportion of positive to negative stress is important in predicting wellbeing (Flook, 2011; Kozusznik et al., 2012); future studies may look to include such a ratio in analysis.

## CHAPTER 9. OVERALL DISCUSSION

### 9.1 Synthesis, Significance, and Contributions of Thesis Findings

Despite prominent theoretical conceptualisations delineating the stress response into both distress and eustress (e.g. Lazarus & Folkman, 1984; Nelson & Simmons, 2003; Selye, 1974), the vast majority of measures focus exclusively on the latter. As the first adolescent measure to appropriately reflect the accepted two-factor approach, the ADES serves to bridge the gap between theory and measurement. While the concept of ‘positive stress’ has been consistently alluded to in the theoretical literature, there was no good-quality measure of general eustress with which to investigate the construct (Chapter 1). High-quality measurement of mental health constructs is crucial for the field of clinical psychology, with the use of theoretically- and/or psychometrically- unsound scales contributing to erroneous research conclusions and impeding clinical practice. The creation of the ADES therefore significantly contributes to the field by providing a high-quality, theoretically grounded measure with which to advance both research and practice.

To ensure a strong theoretical and psychometric foundation for the ADES, development of the scale adhered to methodologically-rigorous and evidence-informed guidelines (Chapter 2; DeVellis, 2012). Each of the studies included in the thesis sequentially contributed to the creation and evaluation of the scale, as well as having individual implications for the broader psychological literature. As a whole, the research provides a more balanced understanding of the clinical impact of stress in adolescence.

Reviewing the literature revealed that ‘stress’ is a relatively new term within the psychological theoretical discourse and has historically been used by both laypeople and researchers to refer to broadly negative emotions (F. Jones & Bright, 2001b; Lazarus &

Folkman, 1984). While there is a lack of consensus as to a coherent contemporary definition of stress, examining prominent theories suggests there is significant overlap between existing models that accept the broad distinction between positive and negative stress (e.g. Cavanaugh et al., 2000; Lazarus & Folkman, 1987; Nelson & Simmons, 2003). In light of this agreement, a partial-consensus definition of stress was created by synthesising these core aspects (Chapter 3). By focussing on those elements upon which key theories agree, this model contributes to the field by allowing for greater comparison and replication across empirical studies (Burton & Hinton, 2010).

The development of the ADES has enabled the testing of specific aspects of the partial-consensus definition, with the overall findings of the thesis lending empirical support to the model. Demonstration that distress and eustress shared a weak, statistically significant, negative correlation ( $r = -.34$  and  $r = -.39$  in Papers 2 and 3 respectively) supports the assertion that the two responses are distinct constructs rather than ends of a continuum. Further, results of Paper 3 suggest that, as expected, the two stress responses are differentially related to key outcomes, including psychological wellbeing. The provision of empirical support for the partial-consensus definition strengthens the model over previous approaches, with research into the validity of existing models focussing almost exclusively on the negative stress response.

A qualitative approach was taken to operationalise the partial-consensus definition, exploring adolescents' lived experience of stress and describing the effect indicators they identified as effectively differentiating between distress and eustress (Chapter 4). These findings were used to generate an initial pool of psychometrically-sound candidate items for inclusion in the ADES (Chapter 5), which were then submitted to a systematic review process to ensure clarity, developmental appropriateness, and overall robustness (Chapter 6). This methodologically rigorous, evidence-informed, and

empirically validated process of creating and refining the scale items contributed to the strong content validity of the final ADES.

The psychometric properties of the novel measure were then comprehensively investigated in a series of evaluation studies, with the ADES demonstrating sound reliability and construct validity in a range of socio-educationally diverse samples (Chapter 7). Initial evidence for the criterion validity of the scale was also provided, with results from Paper 3 indicating the ADES predicts scores on conceptually-related wellbeing and illbeing measures, as would be expected from the theoretical literature (DeVellis, 2012). To enhance the meaningful interpretation of ADES scores, population norms, percentile ranks, and qualitative descriptors were developed based on the total sample of adolescents who took part in data collection for the thesis. Considering all thesis findings together, the ADES adheres to relevant criteria of the Australian Psychological Society's (2016) guidelines for gold-standard psychological testing (see Section 1.3, p. 14), indicating it is a high-quality, psychometrically-sound measure.

Given its simplicity, brevity, and clarity of delivery and scoring, the ADES has the potential to meet the needs of researchers, clinical psychologists, schools, and other adolescent-focussed organisations. The scale is primarily an evaluative and descriptive tool, characterising the positive and negative stress responses and allowing for theoretically-sound empirical research and hypothesis testing. While not intended to offer any diagnostic criteria, the ADES can enhance clinical practice by providing a valid measure with which to monitor clients' progress and the effects of stress management interventions. Further, the scale may be used to examine and track the stress levels of populations of adolescents, for example in the school setting. This could be used to augment efforts to understand respondents' mental health needs and be integrated into evidence-informed school-based interventions. To facilitate large-scale use of the

measure, the ADES was disseminated through the publication of a peer-reviewed academic journal article (i.e. Paper 2) as well as being circulated on the thesis author's personal website. To ensure the widest accessibility of the scale, these outlets were specifically chosen to be open access. Additionally, the scale was shared with relevant stakeholders through the production of an accessible and practically relevant scale manual (Appendix J).

Arguably the key contribution of the ADES is that it allows for greater theoretically-sound investigation into the effects of eustress on adolescents, counteracting the traditionally negative empirical focus. Past research into the differential impacts of stress on adolescent mental health has been hindered by the lack of appropriate measurement tools, with the use of existing negatively-biased, single-dimension scales masking any effects of eustress (e.g. Cavanaugh et al., 2000). In the final study presented in this thesis, the ADES was used to provide a balanced understanding of the impact of stress on positive adolescent mental health (Chapter 8). Results indicated that of all the psychological and behavioural variables examined, eustress had the strongest impact on adolescent wellbeing. This finding challenges the common assumption that stress is inherently dysfunctional, demonstrating that eustress can be associated with profoundly positive consequences. This offers opportunities for clinical intervention, discussed in Section 9.2 below. Given the strength of impact on psychological health, it is suggested adolescent stress should be monitored, so that young people demonstrating high distress and low eustress can be provided with evidence-based interventions (Antaramian et al., 2010; Sevcikova et al., 2001; Suldo et al., 2015b); as described above, the ADES is an appropriate scale for this purpose.

Using CPA to comprehensively explore the mechanisms through which stress and wellbeing were interrelated, the study also highlights the importance of considering

influential contextual factors, such as psychological and behavioural variables, in understanding the impact of stress on wellbeing (e.g. K. Leung et al., 2011). Future research could seek to increase the predictive capacity of the models by considering additional potential moderating and mediating variables, such as self-esteem, physiological symptomology, or age (e.g. Byrne et al., 2007; Mullis et al., 1993; O'Sullivan, 2011; Peacock & Wong, 1990; Rodríguez et al., 2013).

## **9.2 Clinical Implications**

Psychological practice has traditionally adhered to the common assumption that stress is intrinsically maladaptive. As such, clinical psychotherapeutic intervention predominantly focusses on mitigating negative stress-related consequences (e.g. Egger & Reznik, 2017; Kabat-Zinn, 2005; J. C. Smith, 2002). Similarly, Positive Psychology-informed interventions generally seek to reduce stress as a method of increasing individual wellbeing (e.g. Felstead Education, 2019; Mental Health and Wellbeing Education and Training Providers, 2019). However, stress management interventions must be designed and implemented based on the high-quality empirical data, not on assumptions about stress (e.g. Hargrove et al., 2011). The current thesis provides a nuanced reference on stress and therapeutic intervention for the improvement of adolescents' mental health.

Working within a Positive Psychology framework, this thesis expands the traditional emphasis of stress management beyond psychopathology to focus also on positive functioning (e.g. Waters, 2011). Overall, results suggest that contrary to traditional assumptions, stress may be positively leveraged for clinical intervention. Results from Paper 3 revealed distress and eustress both shared a moderate relationship with illbeing, suggesting that clinical intervention aimed at treating mental illness may

look to focus on both distress reduction and eustress generation. However, considering positive psychological health, only eustress had a direct effect on wellbeing. Given the relative strength of their impact on wellbeing, these results suggest that distress reduction may not be a useful target for PPIs aiming to build wellbeing. Instead, it indicates that such interventions may benefit from a focus on generating and reinforcing eustress. However, it is suggested that harmonising traditional deficit-focussed approaches and Positive-Psychology informed practice will contribute to adolescent flourishing, the state of complete mental health characterised by high wellbeing and low illbeing (Section 2.1.1, p. 44). Therefore, it is argued that holistic stress management is required, which expands the focus of intervention beyond distress reduction to also highlight eustress generation (Kozusznik et al., 2012; Nelson & Simmons, 2011; Parker & Ragsdale, 2015). Clinical interventions that fail to differentiate between the dimensions of stress may unintentionally remove the experience of stress that enhances psychological health (e.g. Boswell et al., 2004).

### **9.2.1 Holistic Stress Management Interventions**

Numerous resources exist outlining distress reduction interventions and treatment guidelines for stress-related mental health disorders, so little time will be spent expanding on this here (for examples, the reader is directed towards: Egger & Reznik, 2017; Kabat-Zinn, 2005; J. C. Smith, 2002). Overall, reviews of the clinical literature (e.g. Pakenham & Stafford-Brown, 2012) suggest evidence-based distress management traditionally takes a third wave CBT approach (see Section 1.2.2, p. 12, for further details). However, far less research has been conducted into methods of generating eustress, with the majority of interventions that do exist coming from the field of organisational psychology (e.g. Hargrove et al., 2011). Based on a review of the theoretical and empirical literature, it is speculated that the following interventions may

be associated with increased eustress, however, no trials exist examining the effectiveness of these approaches:

- *Leisure Activities*: Sports and exercise psychology research suggests that engaging in or watching sport and playing fantasy sports is associated with increased eustress (e.g. Dhurup & Dlodlo, 2013; Wann et al., 2002). Other leisure activities have also been found to be associated with eustress, including online gaming (Snodgrass et al., 2016), watching comedy (Benedict, Schiöth, & Cedernaes, 2015), and participating in wilderness experiences such as trekking, rafting, and rock climbing (M. J. Mason, 1987). Leisure activities have also been argued to be particularly important for adolescents, as positive engagement is suggested to facilitate social development, self-efficacy, and autonomy (Shin & You, 2013).
- *Constructive feedback*: Cross-sectional organisational results suggest positive and constructive feedback increases experiences of eustress in the work environment (Hon et al., 2013).
- *Meaningful work and goals*: Organisational literature suggests that empowering workers to accomplish personally meaningful goals increases their experience of eustress (e.g. Hargrove et al., 2015; Hon et al., 2013). This is enhanced when supervisor and individual goals are aligned and there is perceived supervisor support (Hargrove et al., 2015). Translating this to the adolescent setting, eustress may be generated through supporting goal setting and problem solving strategies (Kriščiūnaitė & Kern, 2014). Further, thinking of a school teacher as the equivalent of a workplace supervisor, teacher and student goals should be aligned and intervention may focus on improving teacher support.



- *Mindfulness*: Practicing mindfulness has been suggested to encourage focus, positive affect, and a sense of manageability and vigour, which may be associated with increased eustress (Hargrove et al., 2013).
- *Stress-Mindset*. Research suggests altering an individual's stress-mindset (i.e. an individual's meta-cognitive beliefs about stress being either enhancing or debilitating for health) can modulate the stress response (Crum et al., 2017; Crum et al., 2013; Laferton et al., 2016; Liu, Reed, & Vickers, 2019). For example, an experimental study in which individuals' stress-mindset was manipulated using video clips found that participants who viewed the stress-is-enhancing clip had a more positive response to stressors (Crum et al., 2017).
- *Stress Climate*. Organisational literature has found that a workplaces' stress 'climate', defined as the shared group perception about certain stressors being a source of distress or eustress, may impact on individual's stress appraisals (Kozusznik et al., 2015). Cross-sectional research examining the effect of stress climate on individual outcomes indicated that in eustressed or balanced climates individuals were less exhausted, had more vigour and were more dedicated than in distressed climates. This study concluded that intervention may focus on team training to develop adaptive climates and that the team leader had a key role in improving this climate. (Kozusznik et al., 2015).  
Applying this to adolescent stress interventions, one may consider a classroom as a team and the teacher as a team leader.

Research also highlights several modifiable psychological factors associated with increased eustress that may serve as therapeutic targets, including hardiness, self-

reliance, sense of coherence, and psychological capital<sup>37</sup> (Hargrove et al., 2011; Nelson & Simmons, 2003; Z. Wang et al., 2017). Future research is needed to determine the content of intervention most likely to promote eustress in adolescents and identify evidence-based therapeutic targets.

Empirical literature suggests incorporating psychoeducation into stress management interventions is associated with better outcomes. For example, a small-scale quasi-experimental study of university students found that participants who received psychoeducation ahead of a stress management intervention had more successful outcomes (Hughes et al., 2011). Further, some evidence suggests that psychoeducation may be an effective intervention in and of itself (see Kriščiūnaitė & Kern, 2014). Helping adolescents to develop competencies for recognising the difference between distress and eustress through psychoeducation is suggested to encourage self-reflection (Nelson & Simmons, 2003), which is proposed to offer “a means of identifying a personally acceptable level of eustress, as well as how best to recover, how to regulate workload and other job pressures and one’s own activity in terms of resources at hand” (Tikkamäki, Heikkilä, & Ainasoja, 2016, p. 47). For the current project, as part of the close working relationships with the involved schools, thesis results were disseminated to students, staff, and parents with the goal of providing this psychoeducation. Specifically, the thesis author presented at school assemblies and wrote newsletter articles regarding the results and implications of each round of data collection. Further, input on the associations between stress and wellbeing was provided for the student pastoral care modules at USC and an interactive workshop was presented to interested parents.

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<sup>37</sup> Psychological capital is defined as “a positive state of mind exhibited during the growth and development of an individual and [consisting] of four state--like psychological resources: hope, self-efficacy, optimism and resilience” (Z. Wang et al., 2017, p. 2)

It is suggested that schools are an ideal location for holistic stress management interventions as many of the stressors adolescents face are related to the school environment (de Anda et al., 2000). As adolescents spend much of their time at school, teachers may be best positioned to recognise and respond to stress-related issues (Seligman et al., 2009). Further, as it is estimated 65% of people with a mental illness do not access any treatment (Black Dog Institute, 2012), school-based interventions can overcome barriers to help-seeking such as lack of knowledge of appropriate services and stigma and provide the opportunity to influence psychological health on a wide scale (Chappel et al., 2014; Hopkins, 2014; Seligman et al., 2009).

When thesis results were presented to teachers and education staff at the 2019 Positive Education Schools Association South Australian Chapter State Conference, audience members were asked to brainstorm possible school-based stress management interventions based on the findings. It was unanimously considered that interventions focussed on managing or modifying stressors were the most practical to deliver in the school environment. They proposed students be supported to identify which aspects of their life are distressful and eustressful and problem solve how to increase the positive aspects and decrease the negative aspects. Supporting these suggestions, empirical literature indicates that a critical foundation for any stress management intervention is a comprehensive examination of the stressors in an individual's life, how each contributes to their level of distress and eustress and why, and what changes can be made to enhance the positive response and minimise the negative response (e.g. de Anda et al., 2000; Fletcher, 1994; Hargrove et al., 2013; Kozusznik et al., 2012; Sheu et al., 2002). Examining the ADES alongside stressor checklists, may assist in revealing which demands are associated with distress and eustress for that individual (Rodríguez et al., 2013). By focussing on those stressors most strongly associated with each stress response,

intervention can be more targeted (Rodríguez et al., 2013). It is important to note that this will be specific for individuals, not all people find a stressor as distressful and eustressful, and even within individuals this may be dependent upon timing or environmental factors (Nagel, 2008).

While the above discussion speculates on possible therapeutic targets based on thesis results and the current empirical evidence, significant future research is required to design and evaluate the mode and content of holistic stress management interventions. High quality measurement will be critical in such studies, providing insight into the needs of the population of interest, monitoring client progress, and quantifying the extent to which the intervention is meeting its objectives (e.g. Huppert & So, 2013). Through the creation of the ADES, this thesis provides such a high quality, theory-based measure with which to evaluate future stress management interventions.

### **9.3 Strengths**

The current research provides a novel approach to stress measurement and clinical intervention, providing new and valuable insights into the profoundly positive effects stress can have for adolescents. The research builds on a strong theoretical foundation and contributes to increased knowledge and understanding.

A key strength of the thesis was the collaborative and inclusive approach to research design and data collection. The development of the ADES was fundamentally grounded in the lived experience of young people, placing their unique perspectives and developmental contexts at the centre and accepting them as the foremost experts in their own lives (e.g. Braun & Clarke, 2013; J. Mason & Danby, 2011). Communication with young people was central to the scale's development and adolescent perspectives were incorporated at all main stages (see Section 2.3.3.1, p. 65). By taking this 'child-focussed'

approach, the research is in line with the recommendations of peak bodies on the rights of the child (South Australian Department for Education and Child Development, 2014; United Nations General Assembly, 1989), which highlight the importance of hearing young voices. Previous research suggests that by collaborating with adolescents and ensuring they were key informants at all stages of the research design and analysis, the ADES will contribute to better decision-making and outcomes (Landsdown, 2011; Redmond et al., 2016).

Thesis results are further strengthened by the comprehensive and detailed mixed methods approach, which harmonised qualitative and quantitative methods. Overall, the development of the ADES was methodologically systematic and robust with attention paid to psychometric theory within an evidence-informed scale development framework (i.e. DeVellis, 2012). This rigour resulted in a scale that is brief, reliable, and has demonstrated consistently sound psychometric properties in a variety of samples. An additional key strength of each of the included studies was the size and structure of the recruited samples. The qualitative studies utilised maximum variation sampling (Braun & Clarke, 2013; Grbich, 1999) to ensure that a broad range of participant voices were considered. Interviews were conducted in large samples and continued past saturation to ensure that the data represented many possible factors that may have affected the variability of experiences. The quantitative aspects of the thesis likewise had large, socio-educationally diverse samples with high response rates. These studies were additionally strengthened by the considered use of measures that are well-validated specifically for the adolescent population of interest to operationalise key constructs.

## 9.4 Limitations

### 9.4.1 Threats to Internal Validity

#### 9.4.1.1 *Confounding the stress response with the outcome*

A potential limitation of the current thesis is that there is likely to be a level of conceptual overlap between the ADES and the mental health outcome variables it is intended to predict. As outlined in Section 1.3.1.2.4 (p. 34), response-oriented stress measures are commonly criticised for including some level of this confounding (Byrne et al., 2007; Byrne & Mazanov, 2002; Carter et al., 2015; Lazarus, 1990; Lazarus & Folkman, 1987; Rudolph & Hammen, 1999). This threatens the validity of the ADES and in this context it is reasonable to consider whether the relationships found between stress and wellbeing in the current thesis are spurious. This issue is further complicated by common methods bias, such that both the predictor and outcome variables were not just conceptually similar, but also overlapped in terms of the tangible qualities of the measurement method (F. Jones & Kinman, 2001).

This limitation was specifically considered during the creation of the ADES items. In particular, distress items created from the 'Affect' theme of Paper 1 (i.e. *I felt panicked, I felt overwhelmed, I felt anxious*) were considered to be at risk of overlapping with outcome variables. During the review process, the supervisory team discussed whether these items were clearly distinct as indicators and not outcomes of stress. Reviewing the literature, these items are similarly worded to those included in well-established stress measures, such as the Perceived Stress Scale (e.g. Item 1. '*... how often have you been upset*', Item 3. '*... how often have you felt nervous and "stressed"?*'; S. Cohen et al., 1983) and were therefore considered to be appropriate. Statistically, the correlations found between the ADES and examined psychological and behavioural variables in both Paper 2 and Paper 3 were all below the traditional cut-off for

discriminant validity (i.e. .80; Campbell & Fiske, 1959). This suggests that while there was some overlap between the ADES and outcome measures, they were sufficiently statistically distinct. Indeed, the ADES showed better discriminant validity than did established measures of stress (see Appendix I).

Overall, some level of confounding is argued to be inevitable when using response-oriented measures of stress (Lazarus, 1990) and this undoubtedly applies to the results of the current thesis. Future research utilising the scale must consider this possible overlap between the ADES and measures of psychological mental health it is being used to predict.

#### **9.4.1.2 *Timing of data collection***

Each round of data collection was conducted in the middle two terms of the Australian school year (May-August). However, within this time frame, data collection was completed at each educational institution at different times of the year and day. Given this variation it is likely that different respondents were exposed to different levels of stressors at the point of their participation (e.g. school exams are often held in June). This likely differentially affected the stress levels of the respondents, threatening the internal validity of the results (S. G. Williams et al., 2017). In particular, this may have affected the parameter estimates generated from the normative data set in Chapter 7. Further, as research for Papers 2 and 3 was conducted at the same schools, many of the participants completed very similar questionnaires across two years. This exposes Paper 3's results to repeated testing effects, whereby the participants' familiarity with the testing situation may have influenced the results.

#### **9.4.2 *Threats to External Validity***

While the included research was strengthened by the large and purposefully structured samples, the recruited participant population was relatively homogenous. The

majority of adolescents involved were middle-class, lived in metropolitan regions, and spoke English at home and all were engaged in formal education. This restricted participant population constrains the generalisability of the current thesis results. Further, it is counter to the importance placed on adolescent's own voices, with homogenous sampling meaning certain voices were not represented. Relevant specific population groups of interest are considered below.

First, the research may be limited by sampling exclusively from educational contexts, thereby overlooking adolescents in the workforce, vocational training, and those disengaged from any formal system. It may be expected that some of these adolescents experience more stress due to stressors specific to their life situations or that they may have disengaged from schooling for the very reason of experiencing increased stress (Ystgaard, 1997). Further, samples were derived exclusively from metropolitan areas, excluding rural participants. Adolescents living in rural settings are known to face unique stressors and research has suggested they may be particularly vulnerable to distress (Newland et al., 2014). Thesis results may therefore not be generalisable to these groups.

Secondly, participants were not explicitly screened for diagnosed psychiatric conditions, with scores on the DASS in Paper 3 suggesting that the sample was predominantly non-clinical<sup>38</sup> (Seidel et al., 2016). It is unknown then how the ADES performs in specifically clinical samples and whether it is subject to floor- and ceiling-effects; this may constrain the use of the measure in psychotherapeutic contexts.

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<sup>38</sup> Given commonly reported mental health statistics for adolescents suggest ¼ of young Australians experience a mental illness (e.g. Australian Bureau of Statistics, 2019), it is unlikely that the sample was entirely non-clinical, however, information regarding past or present psychiatric history was not explicitly gathered (Tully et al., 2009).



Further, focussing on population outcomes obscures important information on clinically at-risk sections of the group and those who would benefit from specific intervention (Carter et al., 2015; de Anda et al., 2000).

Thirdly, samples were limited by the small number of gender-diverse participants (7 and 22 participants identified as gender-diverse in the research for Papers 2 and 3 respectively). The relatively small size of these groups precluded their meaningful inclusion in analysis of gender differences and it is therefore unclear how the ADES specifically performs in these samples. Further, analysis in Paper 3 did not allow for the investigation of the effect of stress on psychological functioning for gender-diverse adolescents. However, consistent with a growing body of literature (e.g. Hyde et al., 2014), qualitatively examining descriptive data suggested gender-diverse participants experienced significantly poor mental health (see Appendix M).

Finally, as the thesis findings are derived from predominantly White, English-speaking Australian adolescents, generalisation to other cultures is questionable. Existing literature suggests that the perception of and response to stressors may be a function of cultural values and has been found to vary across countries (Booker et al., 2008; Kozusznik et al., 2012; Michell, 1997). In particular, stress appraisals are suggested to differ between individualist and collectivist cultures (e.g. Popa, Guillet, & Mullet, 2014). Further, the literature review in Chapter 3 suggests the prevailing stress theories are derived in Western culture, with the reviewed models originating in North America and Europe. Cross-cultural evidence however suggests that individuals implicit theories of stress differ across and within cultures (Tan, 1995). The ADES should therefore be considered as a product of these understandings and the Western, Caucasian culture in which it was developed.

Importantly for Australian culture, the research was limited by the minimal engagement of Indigenous participants (recruitment sites had only 1% of their population being Indigenous, contrasting with the approximate 3.3% national estimate; Australian Bureau of Statistics, 2018). As a predominantly collectivist culture (Jalla & Hayden, 2014), understandings of stress in Indigenous groups are likely to differ from the current individualist perspective. Further, given the vast negative disparity with non-Indigenous Australians in critical health, education, and economic domains (Department of the Prime Minister and Cabinet, 2019) it is likely Indigenous Australians as a whole experience more distress than non-Indigenous groups. While there is limited Australian research in this regard, Indigenous groups in North America have been shown to have significantly greater levels of distress than White Americans (Kelley & Lowe, 2012).

Overall, researchers using the ADES must consider how their specific research situations differs from the development setting and how this effects the validity and veracity of research conclusions. Future research should look to re-evaluate the ADES in broader, diverse, and more generalisable samples and assess the degree to which associated empirical findings differ and converge across specific population groups. These results may also benefit from being stratified according to relevant characteristics including age, gender, ethnicity etc. (Corr & Cooper, 2016). Further, future work should specifically consider how the ADES translates and performs in other culture and language groups, with specific reference to Indigenous Australians. Working towards this goal, subsequent to publication of the ADES in Paper 2 and on the author's personal website, requests have been received to translate and utilise the scale in Pakistan, Turkey, Iran, and Indonesia; this research remains ongoing at the time of submission.

### **9.4.3 Potential Limitations of the Adolescent Distress-Eustress Scale and Further Evaluation Required**

Further study and replication is necessary to provide additional evidence for the psychometric properties of the ADES. In addition to the re-evaluation in diverse participant groups described above, future studies should seek to replicate the factor structure in additional samples, examine the temporal stability over a longer period, and examine the scale's relationship with additional validation constructs. Some limitations of the ADES and areas for future research were described in Paper 2's discussion (see Section 7.2.5.2, p. 224), with additional suggestions highlighted below.

#### **9.4.3.1 *Prioritising brevity over theory***

A potential shortcoming of the ADES is its failure to incorporate all dimensions identified in Paper 1 as key indicators of the stress response. Paper 1 revealed six dimensions along with distress and eustress were differentiated (i.e. state of mind, function, perceived efficacy, affect, constitution, and connection), all of which were represented in the initial creation of the 463 candidate items. However, through the review and scale optimisation process these items were reduced to a total of 10, with only the function, perceived efficacy, and affect dimensions represented. While Paper 1 results still served as the foundation for the ADES, the choice was made to prioritise brevity over a full representation of the qualitative results to ensure optimal psychometric properties of the resultant scale and minimise participant burden (DeVellis, 2012; Galešić, 2002). An alternative method would have been to construct the scale from a combination of the best performing items from each dimension. Such an approach would have its own shortcomings, likely compromising reliability to prioritise theory, however, it may have better reflected and respected the unique perspectives, circumstances, and experiences of the adolescent respondents.

#### **9.4.3.2 Criterion-related validity**

While Paper 3 demonstrated some evidence for the criterion-related validity of the ADES in predicting scores on conceptually related psychological health measures, these conclusions are limited by the cross-sectional nature of study and further examination is required. Empirical research suggests that stress scales show the best prediction over one to two months, as perceived stress is at least partially influenced by environmental factors that are variable over a short period (Booker et al., 2008; S. Cohen et al., 1983). Future research should look to evaluate the predictive validity of the ADES over this period utilising longitudinal and/or experimental data.

#### **9.4.3.3 Sensitivity**

Test-retest reliability of the ADES was established in Paper 2 by correlating test scores collected within a maximum of one week of each other. It is therefore unknown if the ADES is sensitive in demonstrating daily variation in stress levels or the magnitude of change seen in clinical psychological intervention (Curtis & Adams, 1991; Kern et al., 2016; Richardon, Cavill, Ellis, & Roberts, 2011). Addressing this is a crucial avenue for future clinical research (Kiang & Buchanan, 2014).

#### **9.4.3.4 Order effects**

While order of scale items was chosen with reference to evidence-informed guidelines (see Section 6.1.1.3.2, p. 158), the effect of item order on scale properties was not explicitly tested. Similarly, in the quantitative surveys, the ADES was always the first scale completed by participants, potentially contributing to bias. Further research is needed to evaluate any potential order effects (e.g. Kern et al., 2016).

#### **9.4.3.5 Updating with time**

While a strength of the ADES was that it was developed with specific reference to the terms and semantics used by the participants in the qualitative studies, the

expression and colloquialisms used by adolescents' change over time. It will therefore be key to periodically update the ADES to ensure that the items continue to be linguistically appropriate (Byrne & Mazanov, 2002).

## **9.5 Additional Prospects for Future Research**

This thesis is an initial step in redressing the negative bias of the existing stress literature, however, much work remains in this area. There is a need for future research to continue to refine the construct of eustress and further investigate its effects (Nelson & Cooper, 2005). The ADES provides a psychometrically sound tool with which to conduct such investigations. Some opportunities for future research are emphasised in the above discussion, with additional prospects highlighted here.

### **9.5.1 Factors Influencing Stress Appraisal**

As discussed in Section 3.3 (p. 93), prevailing theory suggests that stress appraisals are influenced by a combination of situational characteristics and individual differences (Byron et al., 2018; Le Fevre et al., 2003). However, the existing literature offers no clear, unanimous guidance as to the specific factors key in determining how a stressor is appraised, with research limited by the lack of a valid, reliable measure of the stress response. Understanding the nature of these individual and situational characteristics will give greater insight to the modifiable factors important in predicting increased eustress and decreased distress and therefore improved psychological health. Future research should look to use the ADES to investigate the complex interactions between these situational and individual factors (Compas et al., 1987). This depth of evidence will contribute to better informed stress management interventions (Currid, 2008).

### **9.5.2 Incremental Validity**

The current thesis focussed on the response approach to stress measurement (see Section 1.3.1, p. 16), with the creation of the ADES justified by the lack of psychometrically-sound measures available that appropriately captured both the positive and negative stress response. However, there are measures available within the alternative stimulus- and interactional- approaches that allow for some differentiation between positive and negative aspects of stress (e.g. objective stressor checklists: the Academic Challenge Hindrance Measure (LePine et al., 2004) or the Stressful Life Events Checklist (Booker et al., 2004) and interactional measures: the Adolescent Perceived Events Scale (Compas et al., 1987), the Junior High Life Experiences Survey (Swearingen & Cohen, 1985b), or the Life Experiences Survey (Sarason et al., 1978)). Future research may look to examine how the ADES compares and converges with such measures. This research would allow for a test of the incremental validity of the ADES i.e. whether the novel scale adds more information in predicting outcomes than might be obtained from existing measures of stress (Cicero et al., 2016; Corr & Cooper, 2016).

### **9.5.3 Clinical Thresholds for Adolescent Distress-Eustress Scale Scores**

As discussed above, the ADES was created as a descriptive, rather than diagnostic, measure. While meaningful interpretation of the ADES is facilitated through comparison to the derived normative data, future researchers may seek to extend and elaborate on this through the development of clinical thresholds for scale scores. Such thresholds could look to identify the ADES score above which an individual is likely to benefit from intervention or the boundary score between 'normal' and 'clinically-significant' levels of stress. These thresholds would impute a clinically relevant frame of reference for interpreting ADES scores and would provide a useful outcome measure for clinical stress management interventions.

#### **9.5.4 Additional Effects of Stress on Healthy Adolescent Development**

While the vast majority of the existing literature has focussed on the harmful psychological, physical, and behavioural effects of stress, the current thesis provides a balanced understanding of the impact of stress on adolescent mental health. Future studies should further seek to expand this research by investigating the impact of stress on a wider range of variables in a similarly balanced way. Relevant outcomes for clinical psychology may include decision making and behavioural outcomes such as interpersonal effectiveness and school absenteeism.

It is also important to consider the effect of stress on functional outcomes, including academic performance. While organisational literature has found inconsistent evidence for the relationship between stress and work performance (Cavanaugh et al., 2000), in the adolescent context there is some evidence suggesting that the stress response may differentially predict academic performance. In a small scale cross-sectional study of Malaysian students, eustress predicted greater academic success, while distress had no effect on performance (Chua et al., 2018). In a larger scale study, it was found that motivation to learn was predicted by high positive stress and low negative stress, which positively impacted on academic outcomes (LePine et al., 2004). Seeking to expand on these results using the ADES would serve as a valuable contribution to the field.

### **9.6 Conclusion**

Despite consensus within the literature as to the existence of a positive stress response, the construct of eustress has received markedly less research interest than the more intuitively understood distress response (e.g. Le Fevre et al., 2006; Le Fevre et al., 2003). This can be at least partially attributed to the near-exclusive use of negatively-

biased stress measures (e.g. Heikkilä & Mattila, 2018; O'Sullivan, 2011). This thesis counteracts this traditionally negative focus, positively expanding the empirical emphasis to provide a more balanced, holistic approach to stress research and measurement. The research takes a novel, methodologically rigorous approach, harmonising psychological theory, empirical evidence, clinical practice, and adolescents' experiences and leading to significant gains in insight and understanding. Results have clear applications for psychotherapeutic intervention and contribute to a more theoretically-sound, balanced approach to clinical practice.



## APPENDICES

## Appendix A. Paper 1 (Chapter 4) in Published Format



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## BRIEF REPORT

## How Do Young People Experience Stress? A Qualitative Examination of the Indicators of Distress and Eustress in Adolescence

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Extant literature describes stress as an unavoidable occurrence that can be bifurcated into both negative and positive aspects, known as distress and eustress, respectively. Despite this theoretical conceptualization, there are no measures of adolescent stress encompassing both aspects of the construct. In pursuing the creation of such a measure, the current study explored young people's experience of stress, describing the phenomena adolescents identify as salient indicators of both distress and eustress. Semi-structured qualitative interviews were conducted with 20 adolescents; thematic analysis of the transcripts focused on those indicators useful for discriminating between distress and eustress. In all, 6 key dimensions were proposed, along which eustress and distress were differentiated in adolescents: state of mind, function, perceived efficacy, affect, constitution, and connection. Although many of these identified phenomena were comparable with those proposed by the adult-focused literature, the participants demonstrated a range of distinctive perspectives. Unlike adults, the adolescents considered personal connections and self-regard as salient indicators of the stress response, whereas meaningfulness was not considered a pertinent phenomenon. These idiosyncrasies emphasize the inappropriateness of directly translating adult-focused literature to the adolescent context and robustly reiterate the need for a measure of stress that reflects and respects young people's unique experiences.

**Keywords:** distress, eustress, qualitative, adolescent

**Supplemental materials:** <http://dx.doi.org/10.1037/str0000102.supp>

Adolescence is a time of transformation, with young people facing physical, psychological, academic, and social changes (Moksnes, Løhre, Lillefjell, Byrne, & Haugan, 2014). Considering these pressures, many young people experience their adolescence as

a "stressful" period (Venning, Elliott, Kettler, & Wilson, 2013). Whereas lay understandings tend to conceptualize stress as dysfunctional and undesirable (Jones & Bright, 2001), current theory suggests stress is not intrinsically maladaptive.

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This paper is based on the first author's thesis for the degree of Doctor of Philosophy/Master of Psychology

(Clinical) at The University of Adelaide. We are grateful to the adolescents who participated in the study and to the school and university staff who facilitated and supported the interviews. Some of the data from this paper was presented at the 38th Stress and Anxiety Research Society Conference in Hong Kong (July 2017).

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Prominent contemporary stress models, such as the transactional approach (Lazarus & Folkman, 1984) and the holistic stress model (Nelson & Simmons, 2003), emphasize that stress can be both negative and positive. Given the variation between such stress models, the current article takes an integrative approach, synthesizing across theoretical conceptualizations to reach a partial-consensus definition. Broadly, stress is considered as an individual's response to a demanding stimulus, or "stressor." Stressors have no inherent valence, meaning an individual's experience of stress depends on their appraisal of that demand. The resultant response can be differentiated into *distress*, the negative, undesirable, and harmful response to a stressor, and *eustress*, the positive, desirable, and advantageous response to a stressor. These two responses are considered distinct constructs, rather than extremes on a continuum. Although discussion of stress theories has been "waged by argument rather than by experiment" (J. W. Mason, 1971, p. 323), empirical evidence supports the importance of appraisal in the response to stressors (Gonzalez-Morales & Neves, 2015; Lazarus, 1993).

Despite this prominent theoretical conceptualization, there are no measures of adolescent stress that holistically incorporate both distress and eustress. Within the literature, three existing measures capture the distinction between positive and negative stress: the Self-Report Stress Response Questionnaire (Hargrove, Casper, & Quick, 2014), the Valencia Eustress-Distress Appraisal Scale (Rodríguez, Kozusznik, & Peiró, 2013), and the Stress Professionnel Positif et Négatif (De Keyser & Hansez, 1996). However, each of these measures focuses exclusively on the adult work context. The current article represents the early stages of a larger project that will address this disjunct between theory and measurement by developing a novel measure of the adolescent stress response encompassing both distress and eustress.

As with many psychological variables, distress and eustress are theoretical constructs that are not directly observable. To operationalize such "latent" variables, scales are constructed from quantifiable "effect indicators" that serve as observable proxies for the underlying constructs (DeVellis, 2006, 2012). Therefore, developing a measure of the adolescent stress response requires identifying phenomena that can serve as effective, compel-

ling, and well-founded indicators for distress and eustress in this population.

There is no definitive inventory of effect indicators for the stress response for either adults or adolescents. However, the limited extant literature on this topic has advanced numerous psychological, physiological, and behavioral phenomena as potential indicators for the stress response, summarized in Table 1. A prominent example is Nelson and Simmons's (2003) treatment in their holistic stress model. This model emphasizes that eustress and distress are distinguishable by affective state, with distress associated with negative psychological states and eustress with positive psychological states. As instances of these states, Nelson and Simmons proposed anger, alienation, frustration, negative affect, burnout, and anxiety as indicators of distress, and hope, meaningfulness, manageability, and positive affect as indicative of eustress. Other commonly cited examples contrast disturbed with healthy bodily states (McGowan, Gardner, & Fletcher, 2006; Sudefeld, 1997) and dysfunctional with facilitative behaviors (Edwards, Franco-Watkins, Cullen, Howell, & Acuff, 2014; Rice, 1999) as indicative of distress and eustress, respectively.

However, the existing research is limited by its exclusive focus on adults, meaning the indicators proposed are inexorably entrenched within this context. Attempting to directly apply this adult-focused research to the adolescent context discounts the unique experiences of young people. As Compas (1987) outlined: "Adult professionals and researchers may not accurately reflect the experience of children and adolescents, as they are hindered by differences in age, the limits of existing knowledge in the field, theoretical biases . . ." (p. 279).

The fundamental premise of the current research is that adolescents are the experts in their own lives. Therefore, any attempt to understand distress and eustress in this group must be grounded in their experience (Braun & Clarke, 2013; J. Mason & Danby, 2011). Taking a qualitative approach, the overarching purpose of this article is to "give voice" to adolescents, placing their ideas and accounts at the center (Braun & Clarke, 2013). The study aimed to examine adolescents' experience of stress, describing the phenomena young people identify as salient indicators of distress and eustress.



Table 1  
*A Summary of the Phenomena Proposed in the Extant Literature as Effect Indicators of the Stress Response*

Physiological indicators	Behavioral indicators	Psychological indicators	
		Cognitive	Affective
Distress			
<ul style="list-style-type: none"><li>• Accelerated heart rate</li><li>• Backaches</li><li>• Disturbed body states/ill health</li><li>• Exhaustion/fatigue</li><li>• Headaches</li><li>• Loss of appetite</li><li>• Muscular tension</li></ul>	<ul style="list-style-type: none"><li>• Absenteeism</li><li>• Accident proneness</li><li>• Aggression/hostile</li><li>• Alcohol/substance abuse</li><li>• Alienation/withdrawal</li><li>• Bullying and violence</li><li>• Changes in sleep patterns</li></ul>	<ul style="list-style-type: none"><li>• Expecting the worst</li><li>• Hopeless</li><li>• Loss of motivation</li><li>• Loss of recall</li><li>• Negative thoughts</li><li>• Racing thoughts</li><li>• Reduced capacity for decision-making</li><li>• Unfocussed</li></ul>	<ul style="list-style-type: none"><li>• Anger</li><li>• Anxiety</li><li>• Apprehension/dread</li><li>• Doubt</li><li>• Fear</li><li>• Feeling out of control</li><li>• Frustration</li><li>• Guilt/shame</li><li>• Irritability</li><li>• Low self-confidence</li><li>• Negative affect/Sadness</li><li>• Self-pity</li><li>• Worry</li></ul>
<ul style="list-style-type: none"><li>• Physical weakness</li><li>• Rapid/shallow breaths</li></ul>	<ul style="list-style-type: none"><li>• Dysfunctional/damaging/destructive</li><li>• Emotional outbursts</li><li>• Hinders achievement/performance</li><li>• Lower productivity</li><li>• Neglect of responsibilities</li><li>• Restless</li></ul>		
Eustress			
<ul style="list-style-type: none"><li>• Butterflies in the stomach</li><li>• Energized/stimulated</li></ul>	<ul style="list-style-type: none"><li>• Constructive and advantageous</li><li>• Enthusiastic engagement with the task</li></ul>	<ul style="list-style-type: none"><li>• Alert</li><li>• Flow—in the zone</li></ul>	<ul style="list-style-type: none"><li>• Enjoyment</li><li>• Excitement/exhilarated</li></ul>
<ul style="list-style-type: none"><li>• Healthy bodily states/good health</li><li>• Vigor</li></ul>	<ul style="list-style-type: none"><li>• Facilitate achievement/performance</li><li>• Flourishing</li></ul>	<ul style="list-style-type: none"><li>• Focused</li><li>• Hope</li><li>• Manageability</li><li>• Meaningfulness</li><li>• Motivation</li></ul>	<ul style="list-style-type: none"><li>• Fulfilment</li><li>• Gratitude</li><li>• Pleasure</li><li>• Positive affect</li><li>• Satisfaction</li><li>• Thrilling</li></ul>

*Note.* See online supplemental material for relevant citations.

## Method

### Methodological Approach

Taking a qualitative approach allows for in-depth inquiry into this unexamined area of research and is an accepted precursor to scale development (Pope & Mays, 2006). This research is experiential and contextualist, assuming truth can be accessed through language. Language was thus treated as a straightforward window to a person's inner perspective, such that participants' own interpretations were accepted and prioritized (Braun & Clarke, 2006, 2013).

### Participants

**Context.** Adolescence is defined in the South Australian Mental Health Survey as “the

developmental period between the ages of 12 and 20 years” (Venning et al., 2013, p. 31). To fulfill ethical requirements, participants were required to be >13 years old and be fluent in English. In addition, to capture a cross-section of educational institutions, participants were recruited from an independent private school, a public government school, and a tertiary university.

**Sampling.** To ensure participants could provide “information rich” data, purposive maximum variation sampling was conducted (Braun & Clarke, 2013; Grbich, 1999). Participants were chosen based on a selection matrix of age, gender, academic achievement, and educational institution (Figure 1). This transferable sample represents a wide range of sociodemographic factors that may affect the variability of the adolescent stress experience. Saturation

Institute	University						Public Government						Independent Private							
Age	<del>13-14</del>		<del>15-17</del>		18-20		13-14		15-17		<del>18-20</del>		13-14		15-17		<del>18-20</del>			
Gender	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F		
Achievement	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Figure 1. Selection matrix used for maximum variation sampling. Crossed-out cells indicate impossible combinations. H = higher academic achiever; L = lower academic achiever.

was reached after 12 interviews; however, all interviews were completed so as to procure the full range of pertinent features. The final sample consisted of 20 participants (Table 2).

### Data Collection

Semistructured individual interviews of approximately 30-min duration (range = 18:31–38:42) were conducted by the lead author within each institution. Interviews followed a broad

guide of core topics<sup>1</sup> but were open and flexible to interviewee responses. Each interview began with the interviewer defining distress and eustress<sup>2</sup> and discussing the face validity of this model with the participant. Then, participants were asked to discuss distress and eustress in turn. Participants described a specific situation where they experienced the relevant response and recounted the psychological, physiological, and behavioral symptoms they experienced, using their chosen situation as a starting point to discuss the stress response more generally. In addition, to enhance participant engagement and authenticity, time was taken before each interview to familiarize the participants with the interviewer and the expectations of a qualitative interview, building trust and rapport. Interview content was consistent across all interviews, but the language varied to reflect the participant's age. Three pilot interviews were conducted to ensure the developmental appropriateness and efficacy of the interview guide; no data were collected or analyzed from these preliminary interviews.

Ethical considerations emphasized anonymity, informed consent (participant and, where necessary, parental), and safeguarding of participants' emotional well-being. Although privacy was imperative, participants were advised that a mandatory notification protocol was in place. This study was approved by the University of Adelaide School of Psychology: Human Re-

Table 2  
Characteristics of Participants

Participant number	Gender	Age <sup>a</sup>	Institution
P1	F	19	University
P2	M	18	University
P3	F	20	University
P4	M	18	University
P5	F	13	Private
P6	M	15	Private
P7	F	15	Private
P8	M	13	Private
P9	M	13	Private
P10	F	16	Private
P11	M	15	Private
P12	M	16	Public
P13	F	16	Public
P14	M	16	Public
P15	F	16	Public
P16	F	13	Private
P17	M	14	Public
P18	M	14	Public
P19	F	13	Public
P20	F	13	Public

Note. As an ethical requirement, the authors did not have access to participants' academic achievement. Educational leaders at the respective institutions were made aware of the sampling matrix and selected suitable participants from an initial pool of volunteers.

<sup>a</sup> Age in years at the time of Interview 1 (May–August 2016).

<sup>1</sup> Interested readers can e-mail the first author for details of the interview guide.

<sup>2</sup> With consultation from the educational institutions, the choice was made to refer to distress as "bad stress" and eustress as "good stress" to ensure understanding. The use of these terms is reflected in the extracts presented in the Results section.



search Ethics Subcommittee (code number: 16/17) and the Department of Education and Child Development (reference CS/16/00068–1.4).

### Data Analysis

Interviews were audio-recorded and rigorous orthographic transcripts produced. Thematic analysis of these transcripts was undertaken, adhering to Braun and Clarke's (2006, 2013) criteria for good-quality qualitative research. To ensure analysis was flexible and robust, data were managed using NVivo qualitative data analysis software (QSR International, 2014).

After familiarization with the data, complete coding was conducted iteratively. Data were first coded into *a priori*, theoretically driven grandparent codes distinguishing between participants' description of distress and eustress. Within these larger groupings, indicator codes were data driven. To ensure coding was of high quality from the outset, the initial stages were conducted collaboratively between the first and the second author. The authors first coded a subset of the data separately, then came together to negotiate and agree on a coding structure. Using this structure to recode the same data, the authors found high interrater agreement. The first author then independently rated across the entire data set using this coding structure, ultimately consisting of 182 effect indicator codes.

Patterns were then identified across the data set, combining codes to form overarching themes. When considering which patterns were important for the research aim, elements were chiefly considered for meaningfulness over frequency. Themes were derived inductively, being strongly linked to the data and the participants' sensemaking rather than being organized around an explicit theoretical framework.

Member checking was used to review and refine themes and ensure a fit between the analytic interpretation and participants' understandings. During this second interview, the lead author presented an age-appropriate "work-in-progress" thematic map to each of the 16 available participants.<sup>3</sup> Overall, the analysis was unanimously viewed as trustworthy and authentic by participants, helping to establish the credibility and quality of the current findings.

### Results

As discussed earlier, the current study conceptualizes distress and eustress as related, but separate constructs. Although participants identified several phenomena as symptomatic of both stress responses (e.g., increased heart rate), the principal focus of the following analysis is on those indicators discriminating between distress and eustress. Six overarching themes were derived inductively, with each theme representing a key dimension along which eustress and distress can be differentiated. Analysis sought to explore and make sense of how the participants understood and experienced stress, rather than to develop a catalog of stress indicators. As such, results should not be interpreted as an exhaustive inventory of all possible indicators of the adolescent stress response but as a description of those indicators considered salient to the adolescents themselves. An overview of the themes, with sample quotations, can be found in Table 3.

The use of numbers in qualitative research is controversial (Braun & Clarke, 2013). Taking a middle-ground approach, the current analysis uses quantifying language to discuss the prevalence of ideas. In the following discussion, "certain/infrequently" refers to one to three participants, "some/occasionally" to four to six participants, "commonly" to seven to 12 participants, "frequently" to 13–16 participants, and "majority/extensively" to 17–20 participants.

### State of Mind

This theme captures the participants' state of mind in response to a stressor, with their mindset differing during each stress response. Participants frequently reported a negative state of mind as symptomatic of distress. Contrastingly, eustress was constructed as "a good head zone to be in" (P1). Some participants associated distress with having a negative outlook or, more extremely, described catastrophizing, viewing the situation as subjectively worse than objective reality or "the worst thing that can happen" (P10). Participants also frequently described negative thoughts to be indicative of distress. Certain participants outlined that these thoughts

<sup>3</sup> Four participants were unable to attend the follow-up member checking interview.

Table 3  
Summary of Themes With Sample Quotes

Overarching theme (n)	
<u>Distress subtheme, Sample quote</u>	<u>Eustress subtheme, Sample quote</u>
<b>State of mind (14)</b>	
<u>Negative state of mind.</u> <i>I always think of the worst thing. If I get bad stress I always think of like the worst thing that can happen (P10)</i>	<u>Positive state of mind.</u> <i>[My friends] have a bit more of a positive outlook than they would due to bad stress just about like life and general (P15)</i>
<b>Function (20)</b>	
<u>Adverse cognitive functioning.</u> <i>I feel like to me the whole experience is just like fuzzy, so like my head is just fuzzy and I can't concentrate (P1)</i>	<u>Beneficial cognitive functioning.</u> <i>I act really focused when I'm good stress cos like I kinda like it's all I'm thinking about but like you know in a good way obviously (P7)</i>
<u>Adverse behavioral operation.</u> <i>Just feeling like useless in that situation cos I couldn't actually do anything . . . I wanted to do it but I just couldn't (P2)</i>	<u>Motivation.</u> <i>I feel egged on . . . I just wanna face it head on and like I wanna show what I can do (P14)</i>
	<u>Beneficial behavioral operation.</u> <i>I like push myself a lot harder I just keep like even if I find something really hard I like keep at it until I done it (P7)</i>
<b>Perceived efficacy (20)</b>	
<u>Untenable situation.</u> <i>I felt like I couldn't help myself no matter how much I like tried . . . I felt very trapped. (P1)</i>	<u>Workable situation.</u> <i>Cos it's a challenge you feel like you're working towards something . . . like it was worth it (P2)</i>
<u>Low self-regard.</u> <i>I was like really mad at myself like . . . 'I can't believe you don't remember any of this' (P16)</i>	<u>High self-regard.</u> <i>I just feel really confident . . . not in many situations do I feel really like happy with myself. (P1)</i>
<b>Affect (20)</b>	
<u>Sadness.</u> <i>. . . you're unhappy, you're down, and you're like slumpy and you're slow (P18)</i>	<u>Happiness.</u> <i>They're all perky and they're not umm sad, they're not sad faces, they're happy faces (P18)</i>
<u>Infuriated.</u> <i>Little things would just aggravate me . . . I know they're trying to care but it would just frustrate me. (P1)</i>	<u>Composed.</u> <i>I spose good str-stress would just be like when people just seem themselves, seem relaxed (P3)</i>
<u>Angst.</u> <i>I guess you could say but I was again worried, nervous, thinking that I was letting down people . . . yeah negative feelings (P12)</i>	<u>Excitation.</u> <i>I'm probably a little bit boisterous a bit excited about what gonna happen so like almost as if like I'm not able to contain it within myself (P4)</i>
<b>Constitution (18)</b>	
<u>Debilitated.</u> <i>Well I was always- cos I was so stressed like I was always really sick like my-like physically sick (P3)</i>	<u>Hearty.</u> <i>I was just generally really healthy like I didn't really have any problems . . . I never got sick (P3)</i>
<b>Connection (20)</b>	
<u>Disconnected from environment.</u> <i>[My friends] don't really wanna go get involved in something if we're kicking the footy they'd be like 'nah I'll just stand here' (P11)</i>	<u>Connected with environment.</u> <i>If I was having good stress I'd be more interested in doing everything and like getting into stuff (P13)</i>
<u>Disconnected from people.</u> <i>I kinda like lock myself down a bit like I really just don't really want to talk to anyone else, my mind and body just wanna be like one (P11)</i>	<u>Connected with people.</u> <i>I found myself trying like wanting to do more things, like wanting to see- catch up with my friends, wanting to do the Good Samaritan things (P3)</i>

Note. n refers to the number of participants mentioning this theme.

can be automatic and snowball. Commonly, participants ruminate on these thoughts, becoming preoccupied so that “you can’t literally do anything else because . . . it just takes over” (P4). Similarly, participants occasionally experienced “overthinking,” described as “the thought is constantly going through my head over, and

over, and over again” (P20). Inversely, eustress was commonly associated with a “more of a positive outlook” (P15), with participants solely focusing on the positives.

These results only partially resonate with the adult-focused literature. Although a negative state of mind has been suggested as a potential



indicator of distress (Hughes, Gourley, Madson, & Le Blanc, 2011), no literature was identified that proposed a positive state of mind as indicative of eustress. However, the literature does argue that dispositional optimism promotes eustress by encouraging positive appraisals of stressors (Nelson & Simmons, 2003). It is thus consistent for eustress to be associated with a positive state of mind.

### Function

This theme captures the cognitive and behavioral functioning of the participant in response to pressure. During distress, participants frequently characterized their functioning as detrimental, whereas the majority of participants associated eustress with advantageous functioning: "... bad stress is working against you, good stress is kinda working with you" (P2).

**Adverse versus beneficial cognitive functioning.** The key cognitive difficulty of distress was a "buzzing and whirring [mind]" (P1), characterized by racing and fragmented thoughts. This was constructed as an intensely negative experience: "you feel really ((expletive, read as: bad)) . . . it's not really a good impact" (P15). Distress was also occasionally described to be characterized by incoherent, confused thinking; an inability to focus; and illogical thought patterns. Contrastingly, the key cognitive benefit of eustress was a heightened state of focus. More intensely, participants commonly described a state of flow (Csikszentmihalyi, 1990), characterized as complete concentrated engrossment in the task. Although this was constructed as a beneficial state, one participant mentioned that it could negatively translate to irritable reactions when interrupted. Another commonly described cognitive benefit of eustress was increased methodological thinking, where participants' thinking is "more sensible and like really pragmatic" (P1). Certain participants also described increases in receptivity to feedback, mental alertness, thinking clearly, and curiosity. These results echo the adult-focused literature, which likewise contrasts adverse with beneficial cognitive functioning (Edwards et al., 2014; Rice, 1999).

**Motivation.** Supporting the adult-focused literature (Edwards et al., 2014; Hargrove, Quick, Nelson, & Quick, 2011), motivation was a key indicator of eustress, with participants com-

monly describing that "good stress can like- it can motivate you, it can give you like a meaning to like do something" (P10). Furthermore, participants reported feeling "driven," so that being under pressure leads to a sense of being compelled to act. However, incongruently with adult-focused research (Rice, 1999), no participant reported feeling a lack of motivation during distress. However, when reflexively elaborating during member checking, participants speculated that this reflects an omission in reporting, rather than a meaningful difference.

**Adverse versus beneficial behavioral operation.** During distress, participants commonly outlined feeling literally unable to function. Although these accounts focused on belief, not reality, certain participants did outline tangible examples of inadequate operation, such as confused behavior and increased mistakes. Contrastingly, during eustress, participants described improved operation, such as increased capacity for leadership, organization, and proactive behavior. In addition, participants described approach tasks with increased effort during eustress, whereas distress was associated with "completely giv[ing] up" (P10).

These results broadly support the adult-focused literature, which associates distress with dysfunctional behavior and eustress with facilitative behavior (Edwards et al., 2014). However, unlike extant research, the current participants did not discuss any socially undesirable behaviors, such as absenteeism or alcohol/substance abuse (Rice, 1999). This could either suggest that these behaviors are absent in adolescents or, more probably, that responses were mitigated by social desirability factors (Hewitt, 2007).

### Perceived Efficacy

This theme captures a multitude of phenomena related to the individuals' circumstantial belief that they can perform the actions necessary for producing pertinent outcomes. Specifically, all participants described perceiving both themselves and their situation differently depending on their stress response, feeling inadequate during distress and capable during eustress.

**Situation is untenable versus workable.** During distress, all participants described perceiving their situation as untenable. Participants described feeling overburdened and over-

whelmed by their situation, such that you are “never gonna be like free of everything” (P7). Further, some participants felt that everything becomes “harder for you” (P7) during distress. In addition, certain participants described judging that the outcomes of the situation did not justify their input and that their actions were futile. Finally, participants commonly perceived their situation as disagreeable, so that they are reluctant and “want to be out of the situation” (P18).

Conversely, during eustress, participants’ situation was exclusively considered as more workable. Unlike distress, some participants outlined feeling free of onus and “on top of everything” (P3). Moreover, participants occasionally felt pressure made a situation “easier” and “helps you to get further things done” (P15). Furthermore, participants commonly described having a goal that justified their input and “was worth it” (P2). Finally, participants feel actively eager to face the situation, having a real influence on the outcomes and being able to “actually do something” (P1).

The phenomena described here are broadly comparable with the adult-focused literature, which likewise contrasts hope with hopelessness (Le Fevre, Matheny, & Kolt, 2003) and dread with pleasure (Rice, 1999). However, one noteworthy feature failed to resonate with participants: meaningfulness, described as the extent to which a situation is worthwhile and contributes to a purposeful life (Nelson & Simmons, 2003). Although participants did describe eustress as worthwhile, they did not echo the more grandiose sense of purpose. This is consistent with developmental literature positing adolescence as an initial stage toward the eventual cultivation of a sense of purpose (Damon, Menon, & Bronk, 2003).

**Low versus high self-regard.** The majority of participants described distress as indicated by feelings of low self-regard, not being “happy with yourself” (P8), and feeling self-blame for the negative situations in their life. Certain participants also mentioned being intensely self-conscious and feeling that they had let themselves and others down. Divergently, participants commonly outlined that during eustress they had a favorable self-impression. Taken to extremes, some participants described feeling like the best possible version of themselves when under pressure. Participants also occasionally described a

sense of accomplishment and pride, or a more passive feeling of satisfaction with their effort. Although these results broadly align with past research (Lazarus, 1990; Rice, 1999), self-regard has not been a leading focus in the adult-focused literature. This is understandable however when considering developmental theory, which suggests adolescents are more egocentric than adults (Passer & Smith, 2013).

### Affect

This theme captures the emotional, affective landscape of the participant. Supporting the holistic model of stress (Nelson & Simmons, 2003), the two stress responses were distinguishable by affective state, with all participants associating negative emotional tension with distress and positive, high spirits with eustress.

**Sadness versus happiness.** An extensively described symptom of distress was considerable sadness or “((crying)) like not good feelings” (P15). These negative emotions were described by some to commute to grumpy sullenness. More severely, certain participants described clinical feelings of depression and morbid thoughts. Asymmetrically, the majority of participants identified overall happiness and a “good feeling” (P7) as symptomatic of eustress. This distinction conforms with the adult-focused literature (Rice, 1999).

**Infuriated versus composed.** Distress has previously been postulated to be indicated by various aspects of passionate umbrage (Nelson & Simmons, 2003; Rice, 1999), a suggestion echoed by the current participants. Anger was frequently associated with distress and was constructed as a psychological state that was expressed through hostile, aggressive behavior and “blow[ing] up in a rage” (P16). Some participants also outlined that they were perpetually bad-tempered, so that “things can make you angrier more easily” (P9). Further, participants commonly described being irritated, frustrated, and flustered. Contrastingly, eustress was described as being indicated by a sense of composure, with participants “content” (P15) and “calm and collected all the time” (P1). These emotions were not constructed as positive but as an easy acceptance of pressure. This sense of composure has not been previously suggested as an indicator of eustress in the adult-focused



literature, making this subtheme particular to the current study.

**Angst versus excitement.** The majority of participants described distress to be indicated by a suite of angst-ridden emotions. The key indicator here was fear, with participants commonly describing feeling scared during distress. When taken to extremes, participants commonly described going into “panic mode” (P2). Anxiousness was also commonly described to be indicative of distress. Largely, the term “anxiety” was used to refer generally to emotion; however, the one participant with a diagnosed anxiety disorder identified distress as exacerbatory. Contrastingly, all participants described a sense of excitement when experiencing eustress. Associatively, participants commonly described “adrenaline rushing” (P20) and pleasantly queasy “butterflies.” This distinction resonates with extant literature (Hargrove et al., 2011; Rice, 1999).

Participants frequently described feeling “nervous” during both distress and eustress. However, when discussing distress, the term “nervous” referred to a negative state of apprehension and unease, whereas to be “nervous” when eustressed was to be experiencing a positive sense of excited anticipation. Despite this difference in meaning, both stress responses were associated with “nervous energy,” characterized as restless, “fidgety” (P7), behaviors.

### Constitution

This dimension captures the soundness of the body and mind in response to stress. Parker and Ragsdale (2015) argued that the experience of distress depletes energy resources, whereas eustress helps to replenish them. Harmoniously, researchers have associated distress and eustress with disturbed and invigorated body states, respectively (Kozusznik, Rodriguez, & Peir, 2015; McGowan et al., 2006; Nelson & Simmons, 2003). Current findings support this distinction, with distress extensively associated with debilitation and eustress frequently linked to heartiness.

Participants frequently associated distress to be indicated by a generally poor state of physical health. Distress was extensively linked to physical fatigue and tiredness, wherein the “whole body sort of just like shuts down” (P1), as well as a state of complete mental exhaus-

tion. Participants also commonly described feeling lethargic, listless, and “dull” (P6). Further, beyond the strictly physical, distress was infrequently associated with poor “mental health” (P2). Contrastingly, during eustress, participants commonly reported feeling energized, possessing an abundance of vitality that translates into “excited, energetic, buzzing” (P9) behavior. In addition, one participant described eustress as a time of being physically well.

### Connection

This theme encapsulates the connections adolescents have with their world when responding to pressure. All participants described detachment as symptomatic of distress, whereas participants frequently characterized eustress as a time of connection.

**Disconnected versus connected with environment.** The majority of participants described distress as a time of increased disconnection from their environment, feeling “dead to the world” (P1). Participants commonly described being so unenthusiastic that they “don’t want to do anything” (P8). Contrastingly, certain participants associated eustress with increased engagement with their environment, being “more interested in doing everything” (P13). These findings resonate with the adult-based research, which likewise associates distress with withdrawn alienation and eustress with enthusiastic engagement (McGowan et al., 2006; Nelson & Simmons, 2003).

**Disconnected versus connected with people.** Participants frequently described a desire for solitude when distressed. Concomitantly, certain participants described becoming highly insular and emotionally disconnected from others. Contrastingly, during eustress, some participants were more socially connected with their peers. Participants outlined that these states of social connection were recognizable in an individual’s behavior toward others. Participants commonly described “lashing out at people” (P15) during distress, whereas eustress was associated with positive behavior.

Social connection is relatively unexplored in the adult-focused literature, suggesting this subtheme may be particular to adolescents. This is consistent with developmental research suggesting young people place immense value on peer relations when compared with adults (Sie-

ler, DeLoache, & Eisenberg, 2011). In addition, during member checking, participants noted that, unlike adults, adolescents are often in near-constant contact with others, attending group education, living dependently, and engaging with social media.

### Discussion

The current study describes the phenomena identified by adolescents as relevant indicators of the stress response. By taking a qualitative approach, the results contribute to a deeper understanding of this unexamined area of research and serve to “give voice” to adolescents.

Six themes were proposed, representing key dimensions along which eustress and distress are differentiated in adolescents. Eustress was described to be indicated by a positive state of mind, beneficial functioning, greater perceived efficacy, positive emotions, hearty constitution, and a connection with the world. Contrastingly, distress was indicated by a negative state of mind, adverse functioning, lower perceived efficacy, negative emotional tension, debilitation, and detachment from the world. Together, these results appear to be indicative of more short-term responses to pressure, rather than chronic, long-term stress.

Although many of the identified phenomena were comparable with those proposed by the adult-focused literature, current participants demonstrated a range of distinctive perspectives. Departing from the extant literature, personal connections and self-regard were considered salient indicators of the stress response, whereas meaningfulness was not considered a pertinent phenomenon. These findings are understandable when considering the distinctive developmental characteristics of adolescents, namely, that they are egocentric, place great importance on peer relations, and have not yet fully developed a sense of purpose (Damon et al., 2003; Passer & Smith, 2013; Siegler et al., 2011).

### Scope of Application

Qualitative studies are frequently criticized for their lack of generalizability (Pope & Mays, 2006). However, the application of this more quantitative notion to qualitative research is controversial (Grbich, 1999). Certainly, qualita-

tive results are not generalizable in the way quantitative results are; however, they do bear relevance outside their original context (Braun & Clarke, 2013). Transferability, proposed as a more flexible generalizability, considers if the qualitative results can be “transferred” to different contexts (Braun & Clarke, 2013).

One approach to transferability is to examine the extent to which a study’s sample includes the full range of potentially relevant cases (Pope & Mays, 2006). To this end, the study used maximum variation sampling and continued interviewing past saturation, such that the sample represented many possible factors that may have affected the variability of experiences. Although this robust and thorough sampling method is a strength of the current study, the choice of variation factors (age, gender, and academic institution and achievement) were necessarily restricted so as to result in a pragmatically manageable sample size. Future research could look to examine other factors with potential to affect variability of experience, such as ethnicity, socioeconomic status, and being unengaged with the educational system. Overall, the results should be considered not as generalizable to every adolescent population but as transferable to similar contexts.

### Limitations

The current methodology respected the developmental level of participants, taking care to ensure ethical and age-appropriate practices. Nevertheless, interviews were inevitably characterized by an authority imbalance between the participant and the interviewer due to differences in age, knowledge, and power (Hewitt, 2007). This may have contributed to two related limitations. First, participants may have modulated their response to provide answers they supposed the interviewer was expecting, consistent with the “correct-answer” habit expected by schoolteachers (Hatch, 1995). Second, as discussed, there is reason to suggest participants were supplying socially desirable responses. These biases may have inhibited participants’ responses.

### Future Directions

In pursuing the creation of a novel measure of the adolescent stress response, the current study prioritized the perspectives of young people. As



salient dimensions of the adolescent stress response, the results suggest a novel distress–eustress scale should encompass state of mind, function, perceived efficacy, affect, constitution, and connection. Such a scale would reflect and respect the unique experiences, circumstances, and perspectives of adolescents.

### Conclusion

The literature exploring the indicators of the stress response is limited by its exclusive focus on the adult context. In examining adolescents' lived experience of stress, current participants proved unique in a number of facets. These idiosyncrasies reiterate the inappropriateness of directly translating adult-focused literature to the adolescent context and emphasize the need for stress research to reflect and respect the unique experiences of young people.

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**Appendix B. Online Supplemental Material Paper 1: Relevant Citations for Table 8**  
**(Chapter 4, Section 4.3.2)**

Several researchers have informally proposed numerous phenomena as potential indicators for the stress response; these phenomena were summarised in Chapter 4 as Table 8 (Page 113). Table 48 (continued across pp. 332 - 334) expands on this information to include the relevant citations (this table was submitted as online supplemental material for Paper 1).

Table 48

*A Summary of the Phenomena Proposed in the Extant Literature as Effect Indicators of the Stress Response with Relevant Citations*

Distress	Eustress
Physiological Indicators	
<ul style="list-style-type: none"> <li>• Accelerated heart rate (Passer &amp; Smith, 2013; Rice, 1999)</li> <li>• Backaches (Rice, 1999)</li> <li>• Disturbed body states/ill health (Healey, 2002; F. Jones &amp; Bright, 2001a; Kozusznik et al., 2012, 2015; Lazarus, 1993; McGowan et al., 2006; Simmons &amp; Nelson, 2001; Sudefeld, 1997)</li> <li>• Exhaustion/fatigue (Rice, 1999; Sham, 2014)</li> <li>• Headaches (F. Jones &amp; Bright, 2001a; Rice, 1999)</li> <li>• Loss of appetite (Rice, 1999)</li> <li>• Muscular tension (Passer &amp; Smith, 2013; Rice, 1999)</li> <li>• Physical weakness (Rice, 1999)</li> <li>• Rapid/shallow breaths (Passer &amp; Smith, 2013; Rice, 1999)</li> </ul>	<ul style="list-style-type: none"> <li>• Butterflies in the stomach (Hargrove et al., 2011)</li> <li>• Energised/stimulated (e.g. McGowan et al., 2006; Rice, 1999)</li> <li>• Healthy bodily states/good health (Kozusznik et al., 2012, 2015; Nelson &amp; Simmons, 2003)</li> <li>• Vigour (Hargrove et al., 2013)</li> </ul>

Distress	Eustress
Behavioural Indicators	
<ul style="list-style-type: none"> <li>• Absenteeism (Rice, 1999)</li> <li>• Accident proneness (Rice, 1999)</li> <li>• Aggression/hostile (Rice, 1999)</li> <li>• Alcohol/substance abuse (Hargrove et al., 2011; F. Jones &amp; Bright, 2001a; Rice, 1999)</li> <li>• Alienation/withdrawal (Cilliers &amp; Flotman, 2016; Little et al., 2007; McGowan et al., 2006; Nelson &amp; Simmons, 2003; Rice, 1999)</li> <li>• Bullying and violence (Hargrove et al., 2011)</li> <li>• Changes in sleep patterns (Cilliers &amp; Flotman, 2016; Rice, 1999)</li> <li>• Dysfunctional/damaging/destructive (e.g. Healey, 2002; Simmons &amp; Nelson, 2001)</li> <li>• Emotional outbursts (Rice, 1999)</li> <li>• Hinders achievement/performance (B. D. Edwards et al., 2014; F. Jones &amp; Bright, 2001a; Pendleton et al., 2001; Rice, 1999)</li> <li>• Lower productivity (Rice, 1999)</li> <li>• Neglect of responsibilities (Rice, 1999)</li> <li>• Restless (Sham, 2014)</li> </ul>	<ul style="list-style-type: none"> <li>• Constructive and advantageous (Hargrove et al., 2011)</li> <li>• Enthusiastic engagement with the task (McGowan et al., 2006; Nelson &amp; Simmons, 2003)</li> <li>• Facilitate achievement/performance (B. D. Edwards et al., 2014; González-Morales &amp; Neves, 2015; Hargrove et al., 2011; Nelson &amp; Simmons, 2003; Pendleton et al., 2001; Rice, 1999)</li> <li>• Flourishing (Cilliers &amp; Flotman, 2016)</li> </ul>
Psychological Indicators: <i>Cognitive</i>	
<ul style="list-style-type: none"> <li>• Expecting the worst (Passer &amp; Smith, 2013)</li> <li>• Hopeless (Le Fevre et al., 2003; Passer &amp; Smith, 2013; Rice, 1999)</li> <li>• Loss of motivation (Rice, 1999)</li> <li>• Loss of recall (Rice, 1999)</li> <li>• Negative thoughts (Hughes et al., 2011)</li> <li>• Racing thoughts (Passer &amp; Smith, 2013)</li> <li>• Reduced capacity for decision making (Cilliers &amp; Flotman, 2016; Rice, 1999)</li> <li>• Unfocussed (Rice, 1999)</li> </ul>	<ul style="list-style-type: none"> <li>• Alert (Snodgrass et al., 2011)</li> <li>• Flow– in the zone (Snodgrass et al., 2011)</li> <li>• Focussed (B. D. Edwards et al., 2014; Snodgrass et al., 2011)</li> <li>• Hope (Hargrove et al., 2013; Heikkila et al., 2015; Le Fevre et al., 2003; McGowan et al., 2006; Nelson &amp; Simmons, 2003)</li> <li>• Manageability (Hargrove et al., 2013; Little et al., 2007; Nelson &amp; Simmons, 2003)</li> </ul>

Distress	Eustress
	<ul style="list-style-type: none"> <li>• Meaningfulness (Hargrove et al., 2013; Le Fevre et al., 2003; Nelson &amp; Simmons, 2003; Parker &amp; Ragsdale, 2015)</li> <li>• Motivation (B. D. Edwards et al., 2014; Hargrove et al., 2011)</li> </ul>
Psychological Indicators: <i>Affective</i>	
<ul style="list-style-type: none"> <li>• Anger (Cilliers &amp; Flotman, 2016; Lazarus, 1990; Le Fevre et al., 2003; Little et al., 2007; McGowan et al., 2006; Nelson &amp; Simmons, 2003; Parker &amp; Ragsdale, 2015)</li> <li>• Anxiety (B. D. Edwards et al., 2014; Hargrove et al., 2011; F. Jones &amp; Bright, 2001a; Little et al., 2007; Nelson &amp; Simmons, 2003; Rice, 1999; Sham, 2014)</li> <li>• Apprehension/dread (Rice, 1999; Sham, 2014)</li> <li>• Doubt (Sham, 2014)</li> <li>• Fear (Lazarus, 1990; Sham, 2014)</li> <li>• Feeling out of control (Rice, 1999)</li> <li>• Frustration (McGowan et al., 2006; Nelson &amp; Simmons, 2003; Sham, 2014)</li> <li>• Guilt/shame (Lazarus, 1990)</li> <li>• Irritability (Burton &amp; Hinton, 2010; Cilliers &amp; Flotman, 2016; Rice, 1999)</li> <li>• Low self-confidence (Passer &amp; Smith, 2013)</li> <li>• Negative Affect (Cilliers &amp; Flotman, 2016; B. D. Edwards et al., 2014; Jarinto, 2011; McGowan et al., 2006; Nelson &amp; Simmons, 2003; Parker &amp; Ragsdale, 2015; Rice, 1999; Rodríguez et al., 2013; Tan, 1995; Yamaguchi et al., 2004)</li> <li>• Sadness (Lazarus, 1990; Sham, 2014)</li> <li>• Self-pity (Rice, 1999)</li> <li>• Worry (Passer &amp; Smith, 2013; Rice, 1999)</li> </ul>	<ul style="list-style-type: none"> <li>• Enjoyment (Burton &amp; Hinton, 2010)</li> <li>• Excitement/exhilarated (K. Kim et al., 2016)</li> <li>• Fulfilment (Heikkila et al., 2015)</li> <li>• Gratitude (Heikkila et al., 2015)</li> <li>• Pleasure (Burton &amp; Hinton, 2010; Le Fevre et al., 2003; Rice, 1999)</li> <li>• Positive affect (e.g. Hargrove et al., 2013; Hargrove et al., 2011; Healey, 2002; Heikkila et al., 2015; Jarinto, 2011; Kozusznik et al., 2012, 2015; Lazarus, 1990; Le Fevre et al., 2003; McGowan et al., 2006; Nelson &amp; Simmons, 2003; Parker &amp; Ragsdale, 2015; Tan, 1995; Yamaguchi et al., 2004)</li> <li>• Satisfaction (Parker &amp; Ragsdale, 2015; Rice, 1999)</li> <li>• Thrilling (K. Kim et al., 2016)</li> </ul>



## **Appendix C. Interview Guide for Paper 1 (Chapter 4) Qualitative Interviews**

### **Introduction questions to establish rapport**

[Significant time was taken before and during each interview session to build trust and rapport. Below are examples of some introductory questions used]

- ? Why don't you tell me a bit about yourself?
- ? What are your hobbies? Do you play any sports?
- ? What's your favourite subject?
- ? What do you want to do after you have finished school?
- ? Do you have any pets? What are their names?

*My project over the next 4 years is to design a way to measure stress in people of your age. The first part of this project is to investigate how adolescents experience stress.*

*These interviews are going to ask you questions about how you experience stress in your lives; what happens to your body, your mind, and your behaviour. Please be as honest as you can when answering my questions. There are no right or wrong answers.*

### **Lay definitions of stress**

- ? How would you define stress?
- ? If you said "I'm really stressed" what would you mean?
- ? Is it a hard word to define – why?

### **Theory Driven Section**

*So my special area of interest is around the differences between good and bad stress. I'm just going to quickly talk to you about what good and bad stress are so we are all on the same page and then I am going to ask you some questions about your experience of these things.*

*Put simply, both good and bad stress are responses people have to any pressures in their*

*lives. [Refer to prompts]*

### **BAD STRESS is....**

**The negative, undesirable, and harmful response to life's pressures**

### **GOOD STRESS is....**

**The positive, desirable, and helpful response to life's pressures**

*Bad stress is the negative, undesirable, and harmful response to the pressures in our lives.*

*On the other hand, good stress is the positive, desirable, and helpful response to these pressures.*

*Let's think about some examples from my life to make things easier.*

*For me, I would respond to having to do a speech in front of lots of people with negative, undesirable, and harmful bad stress. On the other hand, when I am about to step onto the court for a big netball match, I respond with positive, desirable, helpful good stress.*

*You can see how both of these events put pressure on me and are therefore 'stressful', but that in this case public speaking leads to a bad stress response, while playing in a big netball game leads to a good stress response.*

*Whether you experience good stress or bad stress depends on how you make sense of and react to the pressures in your life. This means that everyone experiences stress differently.*

*For example, I might respond to an exam with bad stress while you might respond with good stress.*

- ? We're going to be talking a lot of good stress and bad stress today, so did that description make sense? Would you like me to explain anything again?

### **Face validity of psychological models**

- ? How much do you think this description of good stress and bad stress applies to your life?

- ? Can you think of times in your life when you have felt good or bad stress?
- ? Do these ideas make sense in your own life? How?

### **Psychological, physiological, and behavioural elements of distress/eustress**

[Below are various prompt questions to tap into each element of distress/eustress. These questions were run through twice, once for distress and then again for eustress]

#### **Situation**

*I'd like you to think about a time when you have experienced bad stress/good stress*

- ? Whenever you are ready, and remembering that you don't have to tell me anything you don't want to, can you describe the situation you are thinking about.

*Keep this situation in mind for the rest of our conversation*

#### **Psychological**

- ? What did you feel?
- ? What feelings did you have?
- ? What emotions did you have?
- ? What thoughts did you have?
- ? What were you thinking?
- ? What thoughts were going through your mind?

#### **Physiological**

- ? Physically, what is going on in your body?
- ? How did your body react?
- ? What sensations are going on in your body?

#### **Behaviour**

- ? How did you behave?
- ? How did you act?

- ? What did you do?
- ? What behaviours did you have?

### In others

- ? Imagine you saw one of your friends, how would you know if they were experiencing bad/good stress?
- ? What emotions would your friends have?
- ? How would your friends behave?
- ? What sort of emotions/behaviours/physical things might you notice in them?
- ? Do you think the things you would notice would be different if they were a boy/girl?

### Other

- ? We've talked a lot about what happens to your mind, body, and behaviour, what haven't we touched on that you think is important?

### Closing Questions

- ? Thinking about everything we have talked about today, both good stress and bad stress, is there anything that we haven't touched on that you think is important?
- ? I think that's everything I had to ask you about, so are there any questions that you want to ask me?

### Appendix D. Initial Adolescent Distress-Eustress Scale Item Pool

As recommended by DeVellis (2012), the initial item pool for the ADES was constructed to be large and over-inclusive, consisting of the following 463 items (262 distress, 201 eustress; continued over pp. 339 - 346):

Distress	Eustress
I automatically thought negative thoughts	I tended to focus on the positives, not the negatives
I couldn't help but think negatively	I had a positive attitude
I focussed on the negatives instead of the positives	I saw things in a positive light
I couldn't see the positives of the situation, only the negatives	I wished I could always feel like this
I tended to focus on the negatives, not the positives	I miss the feeling when I don't have it
I had a negative attitude	I was eager to tackle the situation
I saw things in a negative light	I was eager to deal with the situation
I had lots of negative thoughts	I was raring to go
I wondered 'why did this happen to me?'	I felt confident
I thought things were worse than they really are	I felt confident I could deal with the situation
I over-reacted to the situation	Being under pressure made me more confident
I felt like the situation is worse than it actually was	I was pumped up
I could only think about the pressure I was under	I felt pumped up
I felt like I had a lot on my mind	I felt ready to tackle the situation
I felt swamped	I felt prepared to deal with the situation
I felt like I had too much on my plate	I felt capable
I felt like I had too much to do and not enough time	I felt like I could do it
I felt like everything was piling on top of me	I felt like I could control the situation
I felt overwhelmed	I felt like the situation was resolvable
I had an overwhelmed feeling	I felt light hearted
I felt that everything else became harder	I felt on top of things
Everything felt like a struggle	I felt like I had everything under control
I felt like I couldn't do anything to change the outcomes	I felt everything else became easier
	Being under pressure helps me tackle the situation
	Being under pressure makes it easier to deal with a situation
	I work better under pressure

Distress	Eustress
<p>I felt helpless</p> <p>I felt useless</p> <p>I felt hopeless</p> <p>I felt useless</p> <p>I felt trapped</p> <p>I felt like I couldn't control the situation</p> <p>I felt like the situation is unresolvable</p> <p>I was reluctant to tackle the situation</p> <p>I was unwilling to tackle the situation</p> <p>I didn't want to have to deal with the situation</p> <p>I just wanted to get it over and done with</p> <p>I felt like the outcome wasn't worth bothering</p> <p>I couldn't be bothered dealing with the situation</p> <p>I couldn't see the point of dealing with the situation</p> <p>I worried what others were thinking of me</p> <p>I felt like I am disappointing others</p> <p>I felt like I am letting people down</p> <p>I felt like I am failing people</p> <p>I felt like I am disappointing people</p> <p>I felt I was disappointing others</p> <p>I felt I was letting people down</p> <p>I felt disappointed in myself</p> <p>I felt like I am letting myself down</p> <p>I felt I let myself down</p> <p>I blamed myself for the situation</p> <p>I felt like I should have prevented the situation</p> <p>I should I have prevented the situations</p> <p>I felt like if I'd worked harder I could have avoided the situation</p> <p>I should have worked harder to prevent the situation</p> <p>I thought bad things about myself</p> <p>I talked down to myself</p>	<p>I perform better under pressure</p> <p>The situation felt worthwhile</p> <p>I felt like I was getting something out of it</p> <p>The situation was rewarding</p> <p>The situation was worth it</p> <p>The pressure was worth it</p> <p>I felt like the outcome was worth the effort</p> <p>I had a goal I was working towards</p> <p>I was working towards an achievement</p> <p>I was focussed on achieving a goal</p> <p>I had a sense of accomplishment</p> <p>I felt like I had achieved something</p> <p>I felt proud for dealing with the situation</p> <p>I had pride in myself for dealing with the situation</p> <p>I know I tried my best</p> <p>I am content with how I dealt with the situation</p> <p>I gave it my best shot</p> <p>I was kind to myself</p> <p>I am happy with myself</p> <p>I am not as hard on myself as usual</p> <p>I felt like the best version of myself</p> <p>I felt like I could do anything</p> <p>I am at my best when I am under pressure</p> <p>I felt like I could deal with the situation</p> <p>I believed in my own ability to tackle the situation</p> <p>I felt that I had it in the bag</p> <p>I felt like I had the skills necessary to deal with the situation</p> <p>I believed I could produce a successful outcome</p> <p>I believed in my ability to succeed</p> <p>I believed in my ability to deal with the situation</p> <p>I was confident</p>

Distress	Eustress
<p>I thought badly of myself</p> <p>I was annoyed at myself</p> <p>I was frustrated with myself</p> <p>I was angry with myself</p> <p>I was mad at myself</p> <p>I felt I was not good enough</p> <p>I felt like I couldn't do it</p> <p>I felt like a failure</p> <p>I felt like I couldn't meet other people's expectations</p> <p>I felt like I am not going to do well</p> <p>I felt I wasn't good enough</p> <p>I felt like I stuffed it all up</p> <p>I felt unprepared to deal with the situation</p> <p>I got worked up</p> <p>I was grumpy</p> <p>I was grouchy</p> <p>I was in a bad mood</p> <p>Pressure put me in a bad mood</p> <p>I was moody</p> <p>I felt sad</p> <p>I felt upset</p> <p>I felt miserable</p> <p>I felt unhappy</p> <p>I felt uncomfortable</p> <p>I found most of my emotions were negative</p> <p>I cried</p> <p>I cried more than usual</p> <p>I felt like crying</p> <p>I became aggressive to others</p> <p>I was aggressive towards others</p> <p>I acted aggressively towards others</p> <p>I behaved aggressively towards others</p> <p>I got into more arguments</p> <p>I argued with others more</p> <p>I argued with others a lot</p>	<p>I believed in myself</p> <p>I felt like I knew what I'm doing</p> <p>I found I was more confident than usual</p> <p>I felt happy</p> <p>I had fun</p> <p>I was cheerful</p> <p>I enjoyed being under pressure</p> <p>Being under pressure is a good feeling</p> <p>I smiled because I'm happy</p> <p>I smiled more than often</p> <p>I laughed with others because I was happy</p> <p>I was relaxed</p> <p>I was calm</p> <p>I was composed</p> <p>I was collected</p> <p>I was content</p> <p>I was at ease</p> <p>I was excited</p> <p>I became excited</p> <p>Being under pressure was exciting</p> <p>I felt excited</p> <p>I was excited to tackle the situation</p> <p>I was excited to deal with the situation</p> <p>The pressure made me feel excited</p> <p>Being under pressure was an adrenaline rush</p> <p>I found pressure was an adrenaline rush</p> <p>I feel adrenaline pumping through me</p> <p>I had butterflies in my stomach</p> <p>There were butterflies in my stomach</p> <p>Being under pressure gave my butterflies</p> <p>I felt excited anticipation</p> <p>I excitedly anticipated dealing with the situation</p> <p>I excitedly anticipated tackling the situation</p> <p>I felt healthy</p> <p>I felt physically fit</p>

Distress	Eustress
<p>I found I was in more arguments</p> <p>I found I fought with others more</p> <p>I snapped at others</p> <p>I spoke badly to other people</p> <p>When I spoke to other people I was rude</p> <p>I was angry</p> <p>I was furious</p> <p>I blew up in a rage</p> <p>I got angrier more easily</p> <p>I had a bad temped</p> <p>I was annoyed</p> <p>I felt annoyed</p> <p>I was frustrated</p> <p>I felt frustrated</p> <p>I was irritated</p> <p>It was easier to annoy me</p> <p>I got annoyed more easily</p> <p>I was irritable</p> <p>I got frustrated more easily</p> <p>I felt anxious</p> <p>The situation made me anxious</p> <p>I was anxious</p> <p>I felt scared</p> <p>I was scared</p> <p>The situation frightened me</p> <p>I was frightened</p> <p>I felt fear</p> <p>I panicked</p> <p>I freaked out</p> <p>The situation made me panic</p> <p>I felt panicky</p> <p>I felt apprehensive</p> <p>I had a headache</p> <p>I got headaches more often</p> <p>I got headaches more than usual</p> <p>I felt lightheaded</p> <p>I felt like I was going to faint</p>	<p>I was louder than usual</p> <p>I was rowdy</p> <p>I was boisterous</p> <p>I was more boisterous than usual</p> <p>I was bubbly</p> <p>I was bouncy</p> <p>I was lively</p> <p>I was super active</p> <p>I was bouncing off the walls</p> <p>I found I was more active than usual</p> <p>I was energised</p> <p>I had lots of energy</p> <p>I was energetic</p> <p>I found I had more energy than usual</p> <p>I was more energetic than usual</p> <p>The pressure revitalised me</p> <p>Being under pressure gave me the energy</p> <p>I needed to tackle the situation</p> <p>I found it easy to concentrate</p> <p>It was easier to concentrate under pressure</p> <p>It is easier to focus under pressure</p> <p>I was focussed</p> <p>It was harder to distract me</p> <p>I was attentive</p> <p>I sat still for long period focussing</p> <p>I got lost in my work</p> <p>I forgot about everything else and focused on the situation</p> <p>I concentrated on dealing with the situation</p> <p>I became completely absorbed in the task</p> <p>I was so involved in dealing with the situation, I forgot about everything else</p> <p>I concentrated so hard I lost track of time</p> <p>I concentrated so hard time slowed down</p> <p>I was so involved with my task, I lost track of time</p>



Distress	Eustress
<p>I felt woozy</p> <p>I felt giddy</p> <p>I felt faint</p> <p>I felt unwell</p> <p>I felt unhealthy</p> <p>I got sick</p> <p>I felt like I was getting sick</p> <p>I became ill</p> <p>I was sick more than usual</p> <p>I was less healthy than usual</p> <p>I was ill more than usual</p> <p>I was more ill than usual</p> <p>I felt my mental health was poor</p> <p>My mental health declined</p> <p>My mental health was worse</p> <p>I vomited</p> <p>I felt like vomiting</p> <p>I felt nauseous</p> <p>I got knots in my stomach</p> <p>I felt sick to my stomach</p> <p>I felt tired</p> <p>I felt exhausted</p> <p>I was fatigued</p> <p>I was exhausted</p> <p>I was tired</p> <p>I was sleepy</p> <p>I was very tired</p> <p>I was unenergetic</p> <p>I was listless</p> <p>I had no energy</p> <p>I felt like I had no energy</p> <p>I found I had little energy</p> <p>I lacked energy</p> <p>I had less physical energy</p> <p>I had less energy</p> <p>My body shut down</p> <p>I was physically exhausted</p>	<p>I took feedback on board</p> <p>I was sensible</p> <p>I found I was more sensible than usual</p> <p>I used my brain to work out the best way to deal with the situation</p> <p>I thought hard about the best way to deal with the situation</p> <p>I was able to think better because I was under pressure</p> <p>I tackled the situation proactively</p> <p>I was pragmatic</p> <p>I thought about the situation logically</p> <p>I tackled the situation one step at a time</p> <p>I calmly searched for solutions to the situation</p> <p>I was curious about the situation</p> <p>I was eager to try new ways of tackling the problem</p> <p>I was curious to tackle the situation</p> <p>I found I was thinking clearly</p> <p>I thought more clearly under pressure</p> <p>Pressure increased my ability to think clearly</p> <p>Pressure helps me think clearly</p> <p>I was alert</p> <p>I was aware</p> <p>My mind was active, but not out of control</p> <p>I increased my effort when under pressure</p> <p>I worked harder when under pressure</p> <p>I tried harder when under pressure</p> <p>I made a bigger attempt when under pressure</p> <p>I work better when under pressure</p> <p>I am more efficient when under pressure</p> <p>Pressure made me work better</p> <p>Pressure made me more efficient</p> <p>I was proactive</p>

Distress	Eustress
<p>My body was exhausted</p> <p>I felt physically exhausted</p> <p>I was mentally exhausted</p> <p>My mind was exhausted</p> <p>I couldn't concentrate</p> <p>I couldn't focus</p> <p>It was easier to distract me</p> <p>Concentrating was harder</p> <p>It was harder to concentrate</p> <p>It was harder to focus</p> <p>I got distracted more easily</p> <p>I found concentrating was harder</p> <p>I found focussing was harder</p> <p>I found it was harder to concentrate</p> <p>Pressure made it harder to concentrate</p> <p>Pressure made concentrating more difficult</p> <p>I was easily distracted</p> <p>I couldn't think logically</p> <p>My thoughts were illogical</p> <p>I found it hard to think logically</p> <p>Pressure decreased my ability to think logically</p> <p>My thinking was confused</p> <p>I felt muddleheaded</p> <p>I got confused more easily</p> <p>I found my thoughts were clouded</p> <p>My thinking was unfocussed</p> <p>My thinking was fuzzy</p> <p>I felt disconnected from my body</p> <p>I felt like I wasn't in my body</p> <p>My brain didn't work as well as usual</p> <p>I found I couldn't think as well as usual</p> <p>I found my brain wouldn't work as well as usual</p> <p>Pressure decreased my ability to think</p> <p>My ability to think decreased</p> <p>I found I forgot things I thought I knew</p>	<p>I planned ahead</p> <p>I planned out a solution to the situation</p> <p>I carefully planned a solution to the situation</p> <p>I carefully planned how to deal with the situation</p> <p>I was organised</p> <p>I managed my time well</p> <p>I functioned well</p> <p>I worked well under pressure</p> <p>I showed leadership</p> <p>I provided guidance to others</p> <p>I stuck with it until the end</p> <p>I didn't give up</p> <p>I persevered</p> <p>I pushed myself until I finished</p> <p>I kept at it until it was done</p> <p>I finished what I started</p> <p>I was determined</p> <p>I felt determined</p> <p>I was determined to finish</p> <p>I was driven</p> <p>Being under pressure drove me</p> <p>I was motivated</p> <p>Pressure motivates me</p> <p>Being under pressure motivated me</p> <p>Pressure is motivation</p> <p>I felt motivated</p> <p>I felt engaged with the situation</p> <p>I was interested</p> <p>I was involved</p> <p>I was enthusiastic</p> <p>I responded to the pressure enthusiastically</p> <p>Pressure kept me engaged with the world</p> <p>I was kind to others</p> <p>I encouraged others</p> <p>I was helpful</p>

Distress	Eustress
<p>I had mental blanks</p> <p>I had a mental blank</p> <p>I found I was having mental blanks</p> <p>My thoughts went a million miles per hour</p> <p>My thoughts seemed to jump all over the place</p> <p>My head was buzzing out of control</p> <p>My mind was all over the place</p> <p>My thoughts were going a million miles an hour</p> <p>My thoughts were buzzing out of control</p> <p>My mind was racing</p> <p>My mind was racing out of control</p> <p>I made mistakes more often</p> <p>I found I made mistakes more often</p> <p>I was inefficient</p> <p>I found my behaviour was confused</p> <p>I became unorganised</p> <p>I stopped being organised</p> <p>I was unorganised</p> <p>I was disorganised</p> <p>I felt unable to function</p> <p>I felt like I couldn't function</p> <p>I felt like I was unable to work properly</p> <p>Pressure decreased my performance</p> <p>I performed worse because of pressure</p> <p>I gave up more easily</p> <p>I gave up</p> <p>I completely gave up</p> <p>I found I gave up easier</p> <p>I found I would give up more easily</p> <p>I felt dead to world</p> <p>I couldn't focus on my environment</p> <p>I felt like I was in my own world</p> <p>I felt disconnected from the rest of the world</p>	<p>I wanted others to feel as good as I did</p> <p>I was a pleasant person to be around</p> <p>I was sociable</p> <p>I enjoyed being with friends</p> <p>I wanted to be with my friends</p> <p>I felt more sociable than usual</p> <p>I was chatty</p> <p>I was more talkative than usual</p> <p>I joked around with my friends</p> <p>I wanted to share my opinions with others</p> <p>I wanted to talk to people about my opinions</p> <p>I had good body language</p>

Distress	Eustress
<p>I didn't want to get involved in other things that are happening</p> <p>I was unenthusiastic about things I usually like</p> <p>I was uninterested in things I usually like</p> <p>I didn't want to do anything</p> <p>I was quieter than usual</p> <p>I didn't talk as much in conversations</p> <p>I wasn't as involved in conversations</p> <p>I wanted to be alone</p> <p>I didn't want to socialise</p> <p>I didn't want to see my friends</p> <p>I didn't want to talk to anyone</p> <p>I shut myself off from others</p> <p>I shut people out</p> <p>I was anti-social</p> <p>I blocked others out</p> <p>I wanted to hide myself away</p> <p>I found I wanted to be alone</p> <p>I found I wasn't sociable</p> <p>I found I was more concerned about myself than about others</p> <p>I had so many problems I couldn't focus on anyone else's</p> <p>I couldn't focus on other people because I had my own problems</p> <p>I couldn't focus on other people's problems because I had too many of my own</p> <p>I took it out on others</p> <p>Because I felt bad, I treated others badly</p> <p>I was unpleasant to others</p> <p>I wasn't a pleasant person to be around</p> <p>I lashed out at other people</p> <p>I was rude to others</p> <p>I didn't speak nicely to people</p> <p>I had bad body language</p> <p>I had tense body language</p>	

**Appendix E. Interview Guide for Chapter 6 Cognitive Interview Review**

*Significant time was taken before and during each interview session to build trust and rapport.*

**Explanation****Background**

“So my PhD project is to design a way to measure stress in people of your age. The first part of this project, which I completed last year, was interview young people about how they experience stress. Based on their answers I have designed a new questionnaire.

The next step in the process is to review and test out the questionnaire, to make sure that all the questions make sense to you and aren’t too hard to answer. So today we are going to work together to find any problems with the questions I have written so that I can fix them before we deliver this questionnaire to lots of young people like you.

Ok, so today you are going to be asked to complete the questionnaire in a special way. In a second I am going to ask you to look at a draft of the questionnaire. I need you to read each question to me and then I would like you tell me everything you are thinking about as you answer the question.

It is important for you to remember that I won’t be using your actual answers to the questions. You are not being tested, you are helping me to test out the questionnaire. I need your help to point out any problems with the questions I have written.”

**Practicing think aloud**

“Talking out loud about these things can seem unusual, so before we start I have a really short practice question for us to go through. So I want you to read me the question on the piece of paper and tell me everything you are thinking about while you fill it out:”

PRACTICE QUESTION:

How many windows are in your home?



? Use prompt questions and positive reinforcement

“When you were answering, did you count glass doors? [*Allow response*]. When doing these types of interviews some people do count glass doors while others don’t. When I learn that different people are answering questions differently, it tells me that I need to write the question better.”

? Now that we have done that practice, do you understand what I am asking you to do today

### **Draft Questionnaire Completion**

“Now we are going to go through the questionnaire I have written. So again, remember to read everything out loud and then tell me everything you are thinking about as you read it and answer each question.”

[DRAFT QUESTIONNAIRE SHOWN]

? Use prompt questions and positive reinforcement

### **Closing Statements**

“We have now come to the end of all my questionnaire items.”

? Thinking back over everything we have done today, are there any final comments you have about the questionnaire

? That’s everything I have to ask you about today; are there any questions you want to ask me?

### Prompt Questions

#### **General Prompt:**

- ? What are you thinking right now?
- ? Remember to read aloud for me
- ? Can you tell me more about that?
- ? Could you describe that for me?
- ? What do you mean by that?
- ? Don't forget to tell me what you are thinking as you do that
- ? Why are you having trouble with this item/word?
- ? Could you give me an example?

#### **Specific Prompt for each question:**

- ? What do you think this question means?
- ? Can you tell me in your own words what this question means?
- ? Are any of these words unclear?
- ? Do you think that your friends would answer this question truthfully?

#### **Conditional Prompts:**

<b>If...</b>	<b>Then...</b>
Respondent does not provide verbalisation	What was going through your mind as you tried to answer/as you were thinking about the question?
Period of silence	You took a little while to answer that question. What were you thinking about during that time?

If...	Then...
Answer with uncertainty (evidenced by umms, ahhs, changing answer etc.)	It sounds like your question may be a little difficult for you to answer. If so, can you tell me why?  What occurred to you that caused you change your answer?  “You repeated [word]. Why was that?”
Answer contingent on certain conditions being met (e.g. ‘I’d say about 20 if you don’t need a super precise answer’)	You seem a little unsure. Was there something unclear about the question?
Verbal report indicates misconception or inappropriate response	[Clarify respondents understanding of particular term or the process respondent uses]
Respondent requests information rather than providing answer	If I weren't available or able to answer, what would you decide it means?  Are there different things you think it might mean? What sorts of things?



## Appendix F. Problems Identified with Draft Adolescent Distress-Eustress Scale Items during the Cognitive Interview Review (Chapter 6)

In Chapter 6, a cognitive interview review was utilised to identify which elements of the draft ADES were problematic for adolescent respondents and why (see Section 6.3.3, p. 166). Problems associated with each of the 60 draft scale items were individually coded against Conrad et al.'s (1999) Taxonomy of Problems. Overall, only items 17 (*I enjoyed being under pressure*), 29 (*I felt determined*), 30 (*I felt motivated*), 32 (*I had a negative attitude*), and 46 (*I felt frustrated*) were found to have no associated lexical, inclusion/exclusion, temporal, or logical problems. Table 49 (continued across pp. 332 - 368) summarises analysis of the remaining of the 55 draft scale items, outlining problems experienced by participants and the solutions identified for each item. Participant characteristics are outlined on p. 167

Table 49

### *Problems Identified with Individual Questionnaire Items in the Cognitive Interview Review*

Item	Problems Identified	Solution
1. I was eager to deal with the situation.	This item was associated with only minor lexical issues, with suitable comprehensibility. P12 noted that this item was similar to Item 3: <i>I felt confident I could deal with the situation</i> , but considered that it did ask for different information.	Keep; with lexical changes: <i>I was eager to deal with the pressure</i>
2. I felt confident.	This item was generally problematic. 2 participants (P8, P9) encountered lexical problems with this question, finding the question too vague: "confident in what exactly" (P8). Further, 5 participants (P1, P5, P6, P7, and P9) considered this item to be too similar to Item 3: <i>I felt confident that I could</i>	Discard

Item	Problems Identified	Solution
2. ...cont.	<i>deal with the situation.</i> Of these participants, 80% thought that the alternative item was better. Overall, the item was not considered to capture unique information and was generally problematic for participants. Thus, it was elected to discard this item in favour of item 3	
3. I felt confident that I could deal with the situation.	This question was understood by all participants and caused no inclusion/exclusion, temporal, or logical problems. However, 5 participants (P1, P5, P6, P7, and P9) considered it too be overly similar to Item 2: <i>I felt confident</i> . Of these participants 80% considered that this item was more understandable and overall a preferable to item 2. Overall, as there were no significant issues with this item, it was retained in favour of Item 2.	Keep; with lexical changes: <i>I felt confident that I could deal with the pressure</i>
4. I felt prepared to deal with the situation.	Generally this question caused no major problems for participants. P8 did identify an inclusion/exclusion issue, separating being 'prepared' into being mentally prepared and literally physically prepared. As he was the latter, but not the former, he was unsure which piece of information should be included. However, he resolved this issues in an appropriate manner, and the item did not cause him any further problems. Additionally, 2 participants considered this item to be generally similar to other items (P1: Item 1; P7: Item 5), but not enough to eliminate any items.	Keep; with lexical changes: <i>I felt prepared to deal with the pressure</i>
5. I felt capable.	This question caused comprehension issues for 2 younger participants (P5, P12). Both participants were somewhat unfamiliar with the word 'capable', however, did	Keep; no changes

Item	Problems Identified	Solution
5. ... cont.	independently interpret its meaning correctly. P4 also considered it somewhat similar to Item 4: <i>I felt prepared to deal with the situation</i> . Overall then, this item caused some lexical and computational problems, but they were not fatal.	
6. I felt I worked better under pressure.	This item is almost identical to Item 26: <i>I worked better under pressure</i> ; both were included in the review to examine if one phrase structure was preferred over the other. Four participants commented that it was overly repetitive. Given the overwhelming similarities, it was decided that either this or Item 26 should be deleted. The choice was made to retain this item because, unlike Item 26, it caused participants no problems.	Keep; no changes
7. I felt I performed better under pressure.	This caused no comprehension, inclusion/exclusion, temporal, or logical problems for any participant. The only problem raised (P1, P8, and P9) was that it was similar to Item 6: <i>I felt I worked better under pressure</i> .	Keep; no changes
8. I felt the situation was rewarding.	3 participants (P1, P8, and P10) asked for clarification on this question, but independently interpreted it correctly. Two participants suggested that it was similar to item 9: "I felt the outcome was worth the effort". Overall then, this item caused some lexical and computational problems, but they were not fatal.	Keep; with lexical changes: <i>Being under pressure was a rewarding experience.</i>
9. I felt the outcome was worth the effort.	The item was generally understood, although one participant (P2) questioned how 'the outcome' should be defined. P3 was unsure how to answer the question because they did	Keep; no changes

Item	Problems Identified	Solution
9. ... cont.	not feel that they knew what the outcome of their stressful week was yet. Further, two participants suggested the item was similar to Item 8: <i>I felt the situation was rewarding</i> . Overall then, this item caused some lexical and computational problems, but they were not fatal.	
10. I was focussed on achieving a goal.	This item caused no lexical, temporal, logical, or computational problems. Only one participant (P8) raised a problem with the question: he separated between goals artificially given to him by the school and those he pursued for their own sake. As he was focussed on the former and not the later he was unsure what information should be included. Overall though, the item was considered to capture unique information and caused no major problems.	Keep; no changes
11. I felt like I had achieved something.	This item caused a lexical problem for one participant (P9), who considered the word 'something' to be too vague. Overall, though the item was considered to capture unique information and caused no major problems.	Keep; no changes
12. I felt proud for dealing with the situation.	There were no lexical, inclusion/exclusion, temporal, logical, or computational problems associated with this item.	Keep; with lexical changes: <i>I felt proud for dealing with the pressure</i>
13. I know I tried my best.	This item caused inclusion/exclusion problems for two participants (P7, P12). They argued that sometimes it was not trying your best that puts you under pressure in the first place, so the two were mutually exclusive. However, both sensibly resolved this issue when	Keep; no changes

Item	Problems Identified	Solution
13. ... cont.	answering. Overall then the item was considered to capture unique information and did not cause major problems.	
14. I am content with how I dealt with the situation.	This item caused major lexical issues for young participants. 75% of the younger age group participants were unsure of the word 'content'. All correctly interpreted the word, however, they suggested it is not a word that they would use in daily life and proposed that it would confuse 13 to 14 year olds. Considering this feedback the choice was made to reword this item such that the same information was captured, but the question was more understandably phrased.	Keep; with lexical changes: <i>I was satisfied with how I dealt with the pressure</i>
15. I felt I had the skills I needed to deal with the situation.	This caused no lexical, inclusion/exclusion, temporal, or logical problems. Only P8 encountered a problem with this question, outlining that because he could not make up his mind on this question, he would have opted for an 'I don't know' option were it available.	Keep; with lexical changes: <i>I felt I had the skills I needed to deal with the pressure</i>
16. I believed in my ability to deal with the situation.	In general this item caused no significant issue. One minor lexical problem arose for a younger participant who read "I behaved...I believed" (P12). This suggested the sentence was slightly difficult to read.	Keep; with lexical changes: <i>I believed in my ability to deal with the pressure</i>
18. I felt calm.	There were no lexical, inclusion/exclusion, temporal, or logical problems associated with this item. However, one participant P1 suggested that this question was subsumed by Item 17: <i>I enjoyed being under pressure</i> .	Keep; no changes

Item	Problems Identified	Solution
19 I felt excited to deal with the situation.	<p>This question caused lexical and inclusion/exclusion issues for 3 participants (P2, P3, P8). These participants were confused over the meaning of 'excited', variously describing it as 'enthusiasm' (P2), 'looking forward to something' (P8), and 'nerves' (P3). As they were unsure how to define the word, they were unsure what information they should include when answering. However, these problems were not considered fatal, as these participant suitably and reasonably worked around the problems identified.</p>	<p>Keep; with lexical changes: <i>I felt excited to face the pressure</i></p>
20. Being under pressure was an adrenaline rush.	<p>Several problems were associated with this item. Firstly 7 participants' encountered minor lexical problems: 2 participants suggested the item was incorrectly structured and 5 participants (P3, P5, P6, P7, and P11) were observed to stumble over the phrase 'adrenaline rush'. Secondly, two participants (P1 and P5) identified an inclusion/exclusion problem. They both experienced a 'rush' during pressure, but it was a negative feeling. As they recognised that the item was positioning an 'adrenaline rush' as a positive experience, they were unsure how to respond. Thirdly, P3 considered this question unnecessary and subsumed by Item 19: <i>I felt excited to deal with the situation</i></p> <p>Given these issues this item was considered for deletion by the supervisory team. The decision was made to delete this item as it did not capture unique information and used a phrase that was idiomatic and potentially overly colloquial for a formal questionnaire.</p>	Discard

Item	Problems Identified	Solution
21. I concentrated on dealing with the situation.	There were no lexical, inclusion/exclusion, temporal, logical, or computational problems associated with this item.	Keep; with lexical changes: <i>I was focussed on dealing with the pressure</i>
22. I thought hard about the best way to deal with the situation.	There were no lexical, inclusion/exclusion, temporal, logical, or computational problems associated with this item.	Keep; with lexical changes: <i>I thought hard about the best way to deal with the pressure</i>
23. I tackled the situation one step at a time.	There were no lexical, inclusion/exclusion, temporal, logical, or computational problems associated with this item.	Keep; with lexical changes: <i>I dealt with the pressure one step at a time.</i>
24. I calmly searched for solutions to the situation.	This item caused significant problems for the majority of participants. The major issue was that the question was interpreted to be 'double-barrelled'. Participants had to make a decision as to whether a) they searched for solutions and b) were calm doing so. As these two statement could have two different answers, participants were unsure how to answer. This is considered to be a fatal flaw. Possible rewordings were considered involving the removal of the term 'calm', however it was considered that this would result in an item be overly similar to previous questions.	Discard
25. The pressure made me work harder.	Only one participant identified a problem with this item. P3 considered himself to have worked 'hard' but not 'harder', so was unsure how to respond to the item. However, overall, the item was considered to capture unique	Keep; no changes

Item	Problems Identified	Solution
25. ... <i>cont.</i>	information and did not cause major problems.	
26. I worked better under pressure.	This item is almost identical to Item 6: <i>I felt I worked better under pressure</i> ; both were included in the review to examine if one phrase structure was preferred over the other. Four participants commented that it was overly repetitive. Given the overwhelming similarities, it was decided that either this or Item 6 should be deleted. Only one participant identified an issue with this question. P7 was unsure how to respond because he was trying to balance what he thought of himself and what others thought of him. He was unsure which opinion was more important to include when responding. As this issue did not apply to the phrase structure of Item 6, the choice was made to delete Item 26.	Discard
27. I managed my time well.	This item caused no inclusion/exclusion, temporal, logical, or computational problems. One participant (P5) asked for clarification, but independently interpreted the item correctly.	Keep; no changes
28. I worked well under pressure.	This item was generally problematic. 2 participants (P6, P11) found this question to be overly confusing and were unsure how to answer it. Further, five participants thought that this question was too similar to those previously asked – citing Item 25, Item 6/26, and Item 7 – and did not consider it to capture unique information. These issues were considered to be fatal and as such the decision was made to discard this item	Discard



Item	Problems Identified	Solution
31. I couldn't help but think negatively.	This item caused significant issues for the majority of participants. The major problem was that participants considered the question to be a 'double negative'; the conjunction of 'couldn't' and 'negatively' confused participants. This also led to them failing to select the appropriate response option. It was also considered by 5 participants (4, 5, 10, 11, and 12) to be similar to Item 33: <i>I had lots of negative thoughts</i> . These issues were considered to be fatal and as such the decision was made to discard this item.	Discard.
33. I had lots of negative thoughts.	Only one participant identified an issue with this item. P2 outlined that he did have lots of negative thoughts, but they did not 'effect' him, so was unsure which response option to choose. This item was also considered by 5 participants (P4, P5, P10, P11, and P12) to be similar to Item 31: <i>I couldn't help but think negatively</i> . However, as the decision was made to delete Item 31, this problem was immaterial.	Keep; no changes
34. I felt overwhelmed.	In general this item was well understood by all participants. However, one of the young respondents (P5) failed completely comprehend the question. She referred to the idiom 'overwhelmed with happiness' so assumed that to be overwhelmed was a positive emotion synonymous to 'happiness'. When the misunderstanding was clarified for her, she understood the concept to which this word refers. Given this issue, this item was considered for deletion by the supervisory team. However, acting conservatively, the decision was made to retain the item through	Keep; no changes

Item	Problems Identified	Solution
34. ... cont.	to the Evaluation stage and statistically examine its value.	
35. I didn't want to have to deal with the situation.	This item caused issue for a number of participants. P9 and P10 considered it to be a negatively worded question, stating that they wanted to select an answer indicating this statement was not true but didn't know the appropriate response option as they were trying to negate a statement that is already negative. Further P8 stumbled over the wordiness of the item. Considering this feedback the choice was made to reword this item such that the same information was captured, but the question was more understandably worded.	Keep; with lexical changes: <i>I wanted to avoid dealing with the pressure.</i>
36. I felt I was letting people down.	Overall this question caused only minor inclusion/exclusion and logical problems. Specifically, P7 thought he did let people down, but worked hard to avoid it, so was unsure how to answer. Further, P9 questioned the tense of the question, specifically why this was 'letting people down; and Item 37 was 'let myself down'.  A different issue of note, was that strong emotions were brought up when P10 answered this question. However, it was suspected that this was due to the interview's requirement to think deeply and recount thoughts to another person, not due to the question itself.	Keep; no changes
37. I felt I let myself down.	Overall this question caused only minor inclusion/exclusion and logical problems. P9 questioned the tense of the question, specifically why this was 'let myself down' and Item 36 was 'letting myself down'. Further, P8	Keep; no changes

Item	Problems Identified	Solution
37. ... cont.	struggled to balance his personal feelings about this question and the external evidence he hears from his family, ultimately being unable to decide which information was more important to include.	
38. I was frustrated with myself.	Only one participant (P12) had an issue with this question, reading only "I was frustrated". This was thought to reflect waning attention given the intensity of the interview process.	Keep; no changes
39. I felt like I couldn't control the situation.	This item caused three participants lexical problems. P4 needed to re-read the question to clarify it and P3 could not comprehend the item at all. Further, P8 got the response option incorrect – he wanted to say he could control the situation, but his confusion over the item led him to select the direct opposite response option. Considering this feedback the choice was made to reword this item such that the same information was captured, but the question was more understandably worded.	Keep; with lexical changes: <i>The situation putting me under pressure was out of my control</i>
40. I was in a bad mood.	The only issue identified for this item was that it was somewhat similar to Item 41: <i>I felt miserable</i> , and Item 42: <i>Most of my emotions were negative</i> .	Keep; no changes
41. I felt miserable.	This item caused an inclusion/exclusion problem for P11. He outlined that he felt the emotion but did not express it, so was unsure how to respond to this item. Overall, the major issue was that this item was overly similar to Item 42: <i>Most of my emotions were negative</i> . Given the overwhelming similarities, it was decided that either this or Item 42 should be deleted. The choice was made to retain this item because the supervisory team considered it to be simpler and easier to understand.	Keep; no changes

Item	Problems Identified	Solution
42. Most of my emotions were negative.	The only issue identified for this item was that it was similar to Item 40: <i>I was in a bad mood</i> , and Item 41: <i>I felt miserable</i> . Given the overwhelming similarities, it was decided that either this or Item 41 should be deleted. The choice was made to discard this item because the supervisory team considered Item 41 to be simpler and easier to understand.	Discard
43. I felt like crying.	There were no lexical, inclusion/exclusion, temporal, or logical problems associated with this item. The only problem noted was that participants implied that this answer may be impacted by social desirability. Acting conservatively, the decision was made to retain the item through to the Evaluation stage and statistically examine its value.	Keep; no changes
44. I behaved aggressively towards others.	This item caused significant issues for a number of participants. The major issue identified was with social desirability. Participants noted that this item had an obviously socially acceptable answer, such that respondents will not be motivated to answer honestly: "there's no right or wrong way, except there is a more right way" (P4). Further, P3 and P9 encountered inclusion/exclusion issues: P3 identified as more aggressive, but only to one person, so put answer in middle, and P9 identified that they were normally slightly aggressive towards others so there was no change when under pressure. In both cases they were unsure as to what information to include in their answer. Finally, the word 'aggressively' caused a lexical issue for P12. Finally, this item was not considered to capture unique information,	Discard

Item	Problems Identified	Solution
44. ...cont.	overlapping with Item 45: <i>I got into more arguments</i> , and Item 60: <i>I took it out on others</i> . These other two items however are not as culturally loaded as 'aggressive' and so were considered less likely to be affected by social desirability. Thus, it was elected to discard this item in favour of Items 45 and 60.	
45. I got into more arguments.	The only issue noted for this item was that 2 participants implied that this answer may be impacted by social desirability. Acting conservatively, the decision was made to retain the item through to the Evaluation stage and statistically examine its value.	Keep; no changes
47. I got annoyed more easily.	The only issue noted for this item was that it asked for the same information as Item 48: <i>I was irritable</i> . As younger participants were unable to comprehend 'irritable', Item 47 was retained in favour of Item 48.	Keep; no changes
48. I was irritable.	This item caused significant lexical problems for 5 participants. P5, P11, and P12 all asked for clarification as to what 'irritable' meant, however, all correctly interpreted it independently. P8 and P10 misinterpreted the word as meaning 'irritating others'. All suggested that this is not a word that most younger adolescent would know or use in common parlance. This was considered a fatal problem for the item, and it was discarded in favour of retaining Item 47: <i>I got annoyed more easily</i> .	Discard
49. I felt anxious.	The only issue participants identified with this item was that it was considered similar to Item 50: <i>I felt panicked</i> .	Keep; no changes.

Item	Problems Identified	Solution
49. ... <i>cont.</i>	<p>The supervisory team discussed whether this item was clearly distinct as an indicator and not an outcome of distress. As discussed in Section 5.2, without this distinction the measure may be confounded. In Paper 1, participants used the term "anxious" to refer to the feeling of angst indicative of distress, rather than to the clinically diagnosable outcome (see Section 4.3.4.4.3). Further, the item was considered to be similarly worded to those included in the Perceived Stress Scale, a well-established measure of distress (e.g. Item 1. "..., how often have you been upset ..." Item 3. "..., how often have you felt nervous and "stressed"?". As such, it was determined that this item was not confounded and it was retained.</p>	
50. I felt panicked.	<p>This item caused a lexical problem for P12 who read "I felt pancaked" and interpreted it as meaning 'forced to do this'. It was thought that this mistake was related to loss of concentration nearing the end of the intensive interview process. The only other issue was that it was considered similar to Item 49: <i>I felt anxious</i>. Overall, then this item caused some lexical problems, but they were not fatal.</p>	Keep; no changes
51. I felt like vomiting.	<p>There was one inclusion/exclusion issue with this item, with P2 outlining that he had felt like vomiting but that it was related to illness, not pressure. He was unsure if this was relevant.</p> <p>The major problem with the item was that 50% of participants considered this to be overly similar to Item 51: <i>I felt nauseous</i>. Given the overwhelming similarities, it was decided that either this or Item 52 should be deleted.</p>	Discard

Item	Problems Identified	Solution
51. ... cont.	The choice was made to retain Item 52 because it applied to a wider range of physical debilitations, was clearer, and was preferred by participants.	
52. I felt nauseous.	<p>Two younger participants (P5 and P12) found 'nauseous' a difficult word. Both recognised the word when spoken, but in particular P5 found the spelling counterintuitive. Further, there were minor inclusion/exclusion problems for P2 and P10, who felt nausea unrelated to pressure.</p> <p>50% of participants considered this to be overly similar to Item 50: <i>I felt like vomiting</i>. Given the overwhelming similarities, it was decided that either this or Item 52 should be deleted. The choice was made to retain Item 52 because it applied to a wider range of physical debilitations, was clearer, and was preferred by participants.</p>	Keep; no changes
53. I felt exhausted.	<p>This item caused a temporal issue for 3 participants (P4, P8, and P9). These participants felt exhausted after the pressure had subsided, but not during the experience. They were thus unsure which response option to choose. Despite this issues, all three participants resolved these issues in a sensible and suitable manner.</p>	Keep; no changes
54. My mind was racing out of control.	<p>This item caused temporal problems for 2 participants (P2, P9). They reported their mind was racing out of control only when specifically under pressure, it was not constant. So they were unsure as to which response option best reflects this. However,</p>	Keep; no changes

Item	Problems Identified	Solution
54. ... <i>cont.</i>	both resolved the issue in a sensible and suitable manner	
55. I made mistakes more often.	4 participants displayed an inclusion/exclusion problem for this item. P2 and P5 outlined that they made mistakes a lot regardless of pressure, so unsure whether to answer positively because they made mistakes or negatively before it was not 'more often'. Further, P4 outlined that she did make more mistakes, but they were not severe, so was unsure which option to select. Finally, P11 outlined that at the time he did not feel like he was making mistakes, but later external evidence revealed that he did, such that he was unsure which piece of information to draw on when selecting an answer. Despite these issues, all four participants resolved these issues in a sensible and suitable manner.	Keep; no changes
56. I was uninterested in things I usually like.	This item caused minor lexical problems for two participants, in particular stumbling over the word 'uninterested' While there were no major problems with the item, it was answered in an unexpended manner by P1. The item was written such that we expect those high in distress to answer closer to 'very much like me'. However, P1 suggested she used this as a coping strategy, such that she was more interested in these things during distress. It was planned to follow this up statistically during the evaluation stage.	Keep; no changes
57. I didn't want to talk to anyone.	There were no significant lexical, inclusion/exclusion, temporal, logical, or computational problems with this item. However, the item was answered in an unexpended manner by P1 and P5. The item was written such that we expect those high in	Keep; no changes



Item	Problems Identified	Solution
57. ... <i>cont.</i>	distress to answer closer to 'very much like me'. However, P1 and P5 suggested they used this as a coping strategy, such that they spoke more to people during distress. It was planned to follow this up statistically during the evaluation stage.	
58. I shut myself off from others	There were no significant lexical, inclusion/exclusion, temporal, logical, or computational problems with this item. However, the item was answered in an unexpended manner by P5. The item was written such that we expect those high in distress to answer closer to 'very much like me'. However, P5 suggested she sought others out as a coping strategy, such that she was more open to others during distress. It was planned to follow this up statistically during the evaluation stage.	Keep; no changes
59. I had so many problems I couldn't focus on anyone else's.	This item caused minor lexical, inclusion/exclusion, and computational problems. Firstly, two participants read this question as "couldn't focus on anyone else" indicating they were misunderstanding it as focussing on the person, not on their problems. Further, P6 had an issue with the word 'problem' – this statement was true of them, but did not consider pressure to be a 'problem' so was unsure how to answer. Finally, P2 suggested this may be affected by social desirability, as they interpreted answering positively as indicating that they were a bad person. Overall then, this item caused some problems, but they were not fatal.	Keep; no changes

Item	Problems Identified	Solution
60. I took it out on others.	The only issue noted for this item was that 3 participants implied that this answer may be impacted by social desirability. Acting conservatively, the decision was made to retain the item through to the Evaluation stage and statistically examine its value.	Keep; no changes

## Appendix G. Rationale for Expected Pattern of Relationships between the Adolescent Distress-Eustress Scale and Validation Constructs in Paper 2 (Chapter 7)

Evidence for the construct validity of the ADES was provided in Paper 2 by examining the extent to which it related as expected to related constructs, specifically: self-efficacy, sense of coherence, and the Big 5 personality traits (Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism). As the theoretical and empirical rationale for the expected pattern of relationships was only briefly touched on in Chapter 7, Table 50 (continuing across pp. 369 - 373) provides a comprehensive justification. In this table, – indicates a negative relationship was expected; + indicates a positive relationship was expected, and the number of symbols indicates the expected relative strength of these relationships.

Table 50

*Justification for the Expected Pattern of Results between the ADES and Non-Stress*

*Validation Constructs*

Validation Construct <i>Definition</i>	Expected Pattern of Results		Theoretical and Empirical Justification
	Distress	Eustress	
<b>Self-Efficacy</b> <i>“optimistic beliefs about individual ability to deal with tasks at hand”</i> (Luszczynska et al., 2011, p. 2559)	- - -	+ + +	Significant extant literature suggests that there is a reciprocal, mutual influence between self-efficacy and stress. If the individual positively responds to a stressor, their confidence in themselves to produce desired outcomes in the future is increased (e.g. J. R. Edwards & Cooper, 1988; Parker & Ragsdale, 2015; Quinones et al., 2016), such that eustress promotes self-efficacy. Reciprocally, if an individual’s is confident in their ability to produce desired outcomes, they are more likely

Validation Construct <i>Definition</i>	Expected Pattern of Results		Theoretical and Empirical Justification
	Distress	Eustress	
<p>...cont.</p> <p><i>Self-Efficacy</i></p>			<p>to perceive stressors positively and focus on the opportunities associated with a stressor (Cicognani, 2011; Le Fevre et al., 2003; Luszczynska et al., 2011), thereby promoting the eustress response. These relationships work in reverse for distress. Empirically, positive relationships have been found between eustress and self-efficacy in adolescent samples (Mesurado et al., 2015; O'Sullivan, 2011), while distress has been found to share a weak, negative trend toward the outcome (O'Sullivan, 2011). This relationship was also echoed in Paper 1's qualitative findings, where the stress response could be differentiated along the dimension of Perceived Efficacy.</p>
<p><b>Sense of Coherence</b></p> <p><i>"the extent to which one has a pervasive, enduring though dynamic feeling of confidence that one's internal and external environments are predictable and that there is a high probability that things will work out as well as can be reasonably be expected"</i> (Antonovsky, 1979, p. 123).</p>	- - -	+ + +	<p>Sense of Coherence (SOC) is proposed as a salutogenic construct, used to denote the factors that promote a 'healthy' response to stressors (Antonovsky, 1979; Nelson &amp; Simmons, 2003). Individuals with high SOC are considered more likely to perceive stress as manageable (confident that there are adequate resources are available to cope with the demand), comprehensible (makes sense cognitively), and meaningful (confident that the situation is worthy of investment and commitment; Antonovsky, 1993). As such, individuals with higher SOC are more likely to consider stress as a challenge to overcome rather than as a threat, and are therefore more likely to experience eustress. Empirically, a large cross-sectional study found that SOC</p>

Validation Construct <i>Definition</i>	Expected Pattern of Results		Theoretical and Empirical Justification
	Distress	Eustress	
...cont. SOC			moderates the association between stressor and the experience of negative emotional symptoms in adolescents (Moksnes, Espnes, et al., 2014). These results were echoed in Paper 1, with participants describing their experience of distress as unmanageable, un-worthwhile, and futile while eustress was described as manageable, worthwhile, and consequential.
As an individuals' enduring pattern of thought, feeling, and behaviour, <b>personality</b> is suggested to contribute individual's appraisal of a stressor, thereby influencing their stress response (Saksvik & Hetland, 2011). Specific relationships for each of the Big 5 factors are expanded on below.			
<b>Openness</b> <i>"the breadth, depth, originality, and complexity of an individual's mental and experiential life" (John et al., 2008, p. 138).</i>	-	+	Conceptually, this personality trait has little theoretical overlap with the stress response, however, in the sense that both openness to experience and eustress broadly represent positive interactions with the world, there may be some level of relationship between the two. This is supported by limited empirical evidence suggesting that in response to an artificial laboratory stressor, individuals scoring highly on openness to experience had increased positive affect and decreased adverse effects (P. G. Williams et al., 2009).
<b>Conscientiousness</b> <i>"socially prescribed impulse control that facilitates task- and goal-directed behaviour" (John et al., 2008, p. 138).</i>	--	++	Individuals high in conscientiousness are organised, have higher self-efficacy, and exhibit goal-directed behaviour (McCrae & Costa, 1997). In the same way, eustress is associated constructive, achievement-oriented behaviour and advantageous functioning (e.g. Alzayyat & Al-Gamal, 2014; González-Morales & Neves, 2015). In a cross-sectional study

Validation Construct <i>Definition</i>	Expected Pattern of Results		Theoretical and Empirical Justification
	Distress	Eustress	
<p>...cont.</p> <p><i>Conscientiousness</i></p>			<p>of Norwegian employees, Saksvik and Hetland (2011) found a weak, positive relationship between conscientiousness and occupational eustress. Similarly, Paper 1 found eustress to be indicated by goal-directed behaviour, perseverance, and organisation.</p>
<p><b>Extraversion</b></p> <p><i>“energetic approach towards the social and material world” (John et al., 2008, p. 138).</i></p>	-	+	<p>While this construct is mostly theoretically distinct from the stress response, there are certain similarities. Highly extraverted individuals display sociability, positive emotionality, excitement seeking, and higher activity/energy levels (McCrae &amp; Costa, 1997). Similarly, eustress is associated with positive emotionality (e.g. Hargrove et al., 2011; Nelson &amp; Simmons, 2003), vigour (Hargrove et al., 2013), and feeling energised (e.g. Gibbons et al., 2008; Rice, 1999). Correspondingly, Paper 1 found eustress to be indicated by positive affect, excitation, and invigoration.</p>
<p><b>Agreeableness</b></p> <p><i>“[contrasting] a prosocial and communal orientation towards others with antagonism” (John et al., 2008, p. 138).</i></p>	-	+	<p>This construct is mostly theoretically distinct from the stress response, however, the constructs share some overlap. Those low in agreeableness are antagonistic and argumentative (McCrae &amp; Costa, 1997). Similarly, distress is associated with generally non-agreeable behaviours: bullying/violence towards others (Hargrove et al., 2011), withdrawal from friends and family (Rice, 1999), and aggression (Rice, 1999). Likewise, Paper 1 found distress to be indicated by hostile aggressive behaviour and ‘taking it out on others’.</p>

Validation Construct <i>Definition</i>	Expected Pattern of Results		Theoretical and Empirical Justification
	Distress	Eustress	
<b>Neuroticism</b> <i>“[contrasting] emotional stability and even temperedness with negative emotionality” (John et al., 2008, p. 138).</i>	++	--	This personality construct shares significant theoretical overlap with the distress response and a large body of empirical research has associated distress with negative emotionality (e.g. B. D. Edwards et al., 2014; Nelson & Simmons, 2003; Saksvik & Hetland, 2011). This was likewise reiterated in Paper 1, particularly anxiety and negative affect.

# The Adolescent Distress-Eustress Scale: Development and Validation

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## Abstract

Lay definitions tend to conceptualize stress as negative, undesirable, and maladaptive. However, contemporary stress models emphasize the differentiation between negative and positive stress responses, known as distress and eustress. Despite prominent theoretical conceptualisations accepting the existence of eustress, the vast majority of stress measures tend to focus exclusively on the distress response. The current study introduces the Adolescent Distress-Eustress Scale (ADES) which holistically captures both aspects of the stress response, bridging the gap between theory and measurement and counteracting the typically negatively focused approach to stress research. The ADES was systematically developed and tested in a socio-educationally diverse sample of 981 adolescents ( $M_{age} = 15.19$ , 50.62% female). The finalized self-report scale consists of two 5-item subscales, individually indexing distress and eustress. Initial psychometric properties of the ADES are promising, and the scale has the potential to meet the needs of researchers, schools, and organizations.

## Keywords

measurement and scaling methods, research methods, social sciences, reliability and validity, educational psychology, applied psychology, psychology, stress, adolescence

Adolescence is a crucially stressful period of the lifespan (Noor & Alwi, 2013; Venning, Elliott, Kettler, & Wilson, 2013). During this time, young people face numerous demands, experiencing numerous psychological, physical, and environmental changes (Moksnes et al., 2016; Noor & Alwi, 2013; Vera et al., 2012). Indeed, in a recent survey of Australian adolescents, “stress” was found to be respondents’ number one personal concern (Bailey et al., 2016). However, while the lay assumption is that “stress” is dysfunctional and detrimental (e.g., Jones & Bright, 2001), theory suggests that stress is not inherently maladaptive.

## Defining the Stress Response

In 1974, pioneering researcher Hans Selye defined stress as “the non-specific response of the body to the demands made upon it” (p. 14). Selye argued that the body necessarily produced a response to every demand and therefore considered stress to be ubiquitous and unavoidable (Le Fevre, Matheny, & Kolt, 2003). Crucially Selye’s conceptualization delineated this response into both positive and negative aspects, known as distress and eustress.

Contemporary stress models have retained Selye’s holistic conceptualization, emphasizing the differentiation between positive and negative stress responses. For example, the Transactional Approach (see Lazarus & Folkman, 1984)

outlines that an individual’s experience of stress is dependent on their appraisal of their ability to cope with the stressor. When an individual perceives that their coping skills are inadequate, they will experience negative stress. On the other hand, if an individual perceives their coping skills as adequate, they will experience positive stress. Similarly, the Holistic Model (see Nelson & Simmons, 2003) also differentiates positive from negative stress on the basis of individualized appraisal. However, the latter model focusses more on the salient individual differences predicting the stress response. Supporting both models, empirical evidence emphasizes the importance of appraisal in the experience of stress (Lazarus, 1993).

While these models accept the distinction between positive and negative stress responses, they differ in their specific conceptualization of the stress process. This has led to poor comparison across the literature and little replication of empirical findings (Burton & Hinton, 2010). However, while significant variation does exist between models, all

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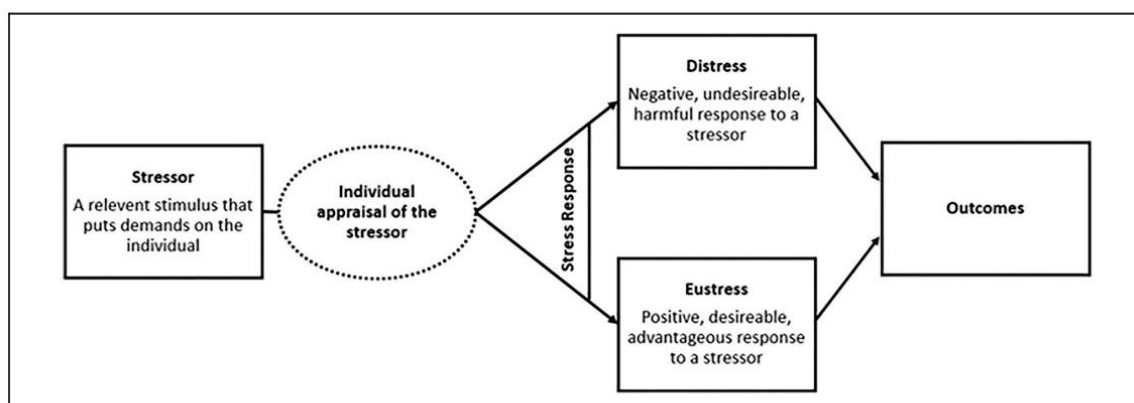
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**Figure 1.** A visual description of the partial-consensus definition of the stress process.

incorporate certain key concepts. As such, integrating across Selye's original work and such contemporary theories, the current study adopts a partial-consensus definition of the stress process, summarized in Figure 1 (see also Branson, Turnbull, Dry, & Palmer, 2018). This definition focuses only on those key elements of the stress process for which there is agreement across the various theoretical models and is thus necessarily broad.

Here, a stressor is any relevant stimulus that puts a demand on an individual. This stimulus can be physical, psychological, "tangible or mentally evoked" (Meir Drexler & Wolf, 2017, p. 286). Stressors are considered to have no inherent valence, such that the stress response is subjective and dependent upon the individualized appraisal of the demand. The resultant response is delineated into both distress, the negative, undesirable, and harmful response, and eustress, the positive, desirable, and advantageous response. The two responses are considered to be distinct constructs, rather than extremes on a continuum. As such, individuals can simultaneously experience distress and eustress.

### Measuring the Stress Response

Despite prominent theoretical conceptualisations accepting eustress, the concept of "positive stress" has received markedly less research interest (e.g., Le Fevre, Kolt, & Matheny, 2006; Le Fevre et al., 2003). Correspondingly, the overwhelming majority of stress measures focus exclusively on what this paper defines as distress. For example, the commonly utilized Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983; Cohen & Williamson, 1988) characterizes stress as a pathological condition. Similarly, another frequently used measure, the Depression Anxiety Stress Scale (DASS; Lovibond & Lovibond, 1995) defines stress as an exclusively negative emotional state. One exception, however, is the Academic Eustress Scale (O'Sullivan, 2011), which focuses on the process of responding positively to

academic stressors as well as the positive outcomes of this process. In response to the lack of validated, reliable measures, various authors have used positive and negative emotional states as proxy measures of distress and eustress (e.g., J. R. Edwards & Cooper, 1988; Parker & Ragsdale, 2015).

To the best of our knowledge, only three published scales holistically measure both distress and eustress: the Self-Report Stress Response Questionnaire (Hargrove, Casper, & Quick, 2014), the Valencia Eustress-Distress Appraisal Scale (Rodríguez, Kozusznik, & Peiró, 2013), and the Stress Professionnel Positif et Négatif (De Keyser & Hansez, 1996). However, all three measures have restricted populations of interest, being developed within the context of organizational psychology and specifically focussing on the adult work context. Applying these vocational, adult-focused measures to the adolescent context is inappropriate when considering the unique developmental contexts and idiosyncrasies of young people (e.g., Compas, 1987). There is thus a need for an adolescent-focussed measure that captures the distinction between positive and negative stress.

### The Current Investigation

The near-exclusive use of negatively biased measures serves to perpetuate the lack of research on positive eustress. To counteract this negative focus, a more balanced approach is required, which holistically takes into account both the negative and positive aspects of the stress response. The overarching goal of the investigation was therefore to develop a brief, reliable, and valid measure of the adolescent stress response. This approach can be contextualized within the field of Positive Psychology, expanding the exclusively deficit-focussed approach to highlight positive human assets (Seligman & Csikszentmihalyi, 2000; Waters, 2011).

Imposing adult measures on young people discounts the unique developmental context of adolescence (e.g., Compas, 1987). As such, the measure was specifically designed for

use in populations aged between 12 and 20 years (as per the South Australian Mental Health Survey definition of adolescence; Venning et al., 2013), with regards to both the content of the scale and the language and format.

The current study introduces the Adolescent Distress-Eustress Scale (ADES). This scale addresses the disjunct between theory and measurement by holistically capturing both aspects of the stress response, with individual subscales indexing distress and eustress (ADES-D and ADES-E, respectively). Specifically, the paper aims to (1) design the ADES by optimizing a preliminary collection of items, (2) evaluate internal and test-retest reliability of the ADES, (3) demonstrate initial construct validity of the measure by assessing convergent and divergent associations, and (4) determine measurement invariance across genders.

## Method

The ADES was established following DeVellis's (2012) practical guidelines for scale development. This framework, which is based on the tenets of Classical Test Theory, outlines four major steps in the development of a questionnaire: defining the constructs, creating, then reviewing the scale items, then evaluating the psychometric properties of the scale. The initial three stages of this process were informed by a series of preliminary qualitative studies, summarized briefly below and described in more detail elsewhere (Branson et al., 2018). The current paper chiefly focusses, however, on the evaluation stage of scale development, describing the optimisation and testing of the ADES.

### Item Generation and Refinement

The creation of the ADES was a collaborative enterprise between the research team and the intended adolescent respondents (Compas, Davis, Forsythe, & Wagner, 1987; Mason & Danby, 2011). To identify potential effect indicators of the stress response, individual interviews were conducted with 20 adolescents (50% female, 13-20 years old), to elicit their personal experience of stress. These interviews focussed on the phenomena that adolescents identified as compellingly and effectively differentiating between distress and eustress. On the basis of these qualitative results, 463 candidate items were generated for consideration in the final scale.

These items were then sent to subject matter experts for feedback regarding content validity, clarity, and developmental appropriateness. Furthermore, cognitive interviews were conducted with 12 adolescents (50% female, 13-19 years old) to identify and amend the elements of the draft questionnaire proving problematic for the intended respondents. Based on this review process, the items were refined, improved, and combined to form a cohesive preliminary scale consisting of 25 candidate items per subscale.

### Participants and Procedure

To obtain a broad, generalisable sample, students (over the age of 13) from three different educational institutions of varying socio-educational advantage (independent private school, university, and public government school) were invited to take part in the online survey. Ethical considerations emphasized anonymity, confidentiality, informed consent (participant, and where necessary parental), and safeguarding participants' emotional wellbeing. All procedures were approved by The University of Adelaide School of Psychology: Human Research Ethics Subcommittee (Code Numbers: 17/10 and 17/65) and The Department of Education and Child Development (Reference CS/17/000,747-1.14).

**Split samples procedure.** For analysis purposes, the total sample ( $N = 981$ ) was randomly split into two approximately equivalent subsamples. One half, the Development Subsample, was used for item selection and scale optimization through exploratory factor analysis (EFA). The second, Cross-checking Subsample was used to support these results through confirmatory factor analysis (CFA). The size of each subsample exceeded the commonly recommended minimum of 300 participants required for factor analysis (e.g., DeVellis, 2012).

In addition, all students recruited from the University were asked to complete the preliminary ADES a second time within 1 week of the initial questionnaire. This Follow-Up Subsample was used to evaluate the test-retest reliability of the scale. Internal reliability and validity were evaluated using the total sample.

**Description of sample.** The socio-demographic characteristics of participants are presented in Table 1.

### Materials

In addition to the preliminary ADES described above, the online self-report questionnaire consisted of the six established scales described below.

**Short-Form Marlowe-Crowne Social Desirability Scale.** Socially desirable responding, or the tendency to deny socially undesirable traits and/or emphasize socially desirable traits (Nederhof, 1985), is a common source of bias affecting the validity of self-report measures. To investigate the influence of socially desirable responding on the ADES, the Reynolds (1982) short-form of the Marlowe-Crowne Social Desirability Scale (MC-SDC-13) was included in the online questionnaire. This reliable and valid short form of the original scale (Crowne & Marlowe, 1960), consists of 13 *True-False* items and has been used in samples as young as 10-years-old (Wang, Fu, Zhang, & Kou, 2015). The reliability in the current sample was  $\alpha = .66$ .



**Table 1.** Sample Sociodemographic Characteristics.

Characteristic	Main sample (N = 981)	Subsamples		
		Development subsample (n = 491)	Cross-checking subsample (n = 490)	Follow up subsample (n = 83)
Age, M (SD)	15.19 (1.70)	15.19 (1.96)	15.19 (1.70)	18.73 (0.86)
Gender, n (%)				
Male	477 (48.62)	237 (48.27)	240 (48.98)	19 (75.90)
Female	497 (50.62)	251 (51.12)	246 (50.20)	63 (22.89)
Other	7 (0.71)	3 (0.61)	4 (0.82)	1 (1.20)
Language background, n (%)				
English	763 (77.78)	383 (78.00)	380 (77.55)	51 (61.45)
Other	218 (22.22)	108 (22.00)	110 (22.45)	32 (38.55)
Educational institution, n (%)				
University	93 (9.48)	46 (9.37)	47 (9.59)	83 (100.00)
Private school	563 (57.39)	282 (57.43)	281 (57.35)	0 (0.00)
Public school	325 (33.13)	163 (33.20)	162 (33.06)	0 (0.00)

**Academic Eustress Scale.** The Academic Eustress Scale (AES; O'Sullivan, 2011) defines eustress as both the process of responding positively to stressors as well as the positive outcomes of this process. Specifically, this scale focusses on eustress related to academic stressors in adolescent and young adult populations. Responses to the 10-item scale range from *never* (0) to *always* (5), with higher mean scores indicating greater experience of academic eustress. The reliability in the current sample was  $\alpha = .83$ .

**Perceived Stress Scale.** The Perceived Stress Scale (PSS-10; Cohen et al., 1983; Cohen & Williamson, 1988) frames stress as a negative, undesirable, pathological phenomenon, measuring the extent to which one finds their life to be unpredictable, uncontrollable, and overloading. Responses to the 10-item scale range from *Never* (0) to *Very Often* (4) with greater sum scores indicating greater experience of negative stress. The PSS-10 has robust psychometric properties in both adult and adolescent samples (Cohen et al., 1983; Cohen & Williamson, 1988; Williams, Turner-Henson, Langhinrichsen-Rohling, & Azuero, 2017). The reliability in the current sample was  $\alpha = .87$ .

**General Self-Efficacy Scale.** Self-Efficacy, defined as "optimistic beliefs about individual ability to deal with tasks at hand" (Luszczynska, Piko, & Januszewicz, 2011, p. 2559) was assessed via the General Self-Efficacy Scale (GSES; Schwarzer & Jerusalem, 1995). Responses to the 10-item scale range from *not at all true* (1) to *exactly true* (4), with higher total sum score indicating greater self-efficacy. The measure is considered valid for use in youths, including adolescents (Schwarzer & Jerusalem, 1995). The reliability in the current sample was  $\alpha = .85$ .

**Orientation to Life Questionnaire.** Sense of Coherence (SOC) is defined as

a global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that one's internal and external environments are predictable and that there is a high probability that things will work out as well as can be reasonably be expected. (Antonovsky, 1979, p. 123)

This construct was measured using the Orientation to Life Questionnaire (SOC-13; Antonovsky, 1979), which assesses SOC along three dimensions: comprehensibility, meaningfulness, and manageability. Participants respond to 13 items along a semantic differential scale with diametrically labeled continuum ends. Higher sum scores indicate greater SOC. The scale has shown acceptable reliability in studies with adolescents (e.g., Margalit & Eysenck, 1990; Moksnes, Espnes, & Haugan, 2014). The reliability in the current sample was  $\alpha = .79$ .

**Big Five Inventory.** The Five Factor Model (e.g., McCrae & Costa, 1997) was used to conceptualize personality in the current study. This model describes personality along five dimensions: Openness to experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. Utilizing the Five Factor theoretical framework, personality was measured using the Big Five Inventory (BFI; John, Naumann, & Soto, 2008). The scale consists of 44 items with responses ranging from *disagree strongly* (1) to *agree strongly* (5). Subscale scores are computed as the average of the corresponding items, with higher scores indicating greater endorsement of the respective personality trait. The BFI is accessible to children as young as 10 (Soto, John, Gosling, & Jeff, 2011). Reliability in the current sample ranged from  $\alpha = .70$  to  $.84$ .

### Data Analysis

Prior to data analysis, data were screened for obviously frivolous responses (Fan et al., 2006). Outliers for each variable were identified and trimmed using the Hoaglin and Iglewicz (1987) modification of the Tukey (1977) Outlier Labeling rule.<sup>1</sup> Missing data were managed via Listwise deletion (Allison, 2001; Schreiber, 2008). CFA was conducted using the software Amos Graphics (Arbuckle, 2017). All remaining analyses were conducted in SPSS Version 24 (SPSS Inc., 2017).

**Measure optimisation.** In the first stage of analysis, the scale was optimized to be suitably parsimonious, with an ideal aim of 5 items per subscale (Costello & Osborne, 2005). For balance, equal numbers of items were included in the distress and eustress subscale.

Following the recommendations of DeVellis (2012), the preliminary item pool was screened for deficient psychometric properties prior to entry into factor analysis, according to three elimination criteria. First, inter-item correlations were considered. Considering the distress and eustress items separately, items would be discarded if they shared inconsistent correlation patterns (i.e., positive correlation with some items and negative relationship with others). Furthermore, in the case of multicollinearity ( $r \geq .8$ ), only one item would be retained. Second, to ensure appropriate distribution and variance of item responses, highly skewed ( $\text{skew} > |2|$ ) and/or leptokurtic ( $\text{kurtosis} > 2$ ) items would be discarded. Finally, items sharing more than a moderate correlation with the MC-SDC-13, thereby being influenced by social desirability bias, would be discarded.

The remaining items of the preliminary ADES were subjected to a series of iterative EFAs (maximum likelihood extraction method) using the Development Subsample. As distress and eustress are expected to correlate, the solution was rotated using an oblique direct oblim rotation ( $\Delta = 0$ ). To produce a suitably parsimonious scale, items were deleted iteratively according to factor loadings, until no cross loadings exceeded  $\geq 0.3$  and either all items loaded on one factor  $\geq 0.7$  or a minimum of 5 items loaded on each factor  $\geq 0.5$  (Costello & Osborne, 2005). Furthermore, beyond exclusively statistical criteria, the appropriate theoretical alignment of items and the interpretability of the retained pool as a cohesive questionnaire were also considered (DeVellis, 2012).

Following EFA, CFA (maximum likelihood estimation method) was conducted using the Cross-checking Subsample to confirm the structure of the ADES. Model fit was evaluated primarily using the root mean square error of approximation (root mean square error approximation [RMSEA]), the comparative fit index (CFI), and the Tucker–Lewis Index (Tucker–Lewis index [TLI]). A RMSEA less than 0.08 combined with a CFI and TLI greater than 0.95 was considered to indicate good model fit (Hu & Bentler, 1999; Schreiber, 2008). Following the recommendations of Schreiber (2008), the  $\chi^2$  statistics was also reported; however, this value was

not used to judge model fit as it is extremely sensitive to sample size (e.g., Cheung & Rensvold, 2002). For comparison, a one-factor model (all items loading on a single “stress response” factor) and a second-order hierarchical model (items loading on two subscales, which load on a single higher-order “stress response” factor) were also estimated. Model comparison was assessed using the  $\chi^2$  difference test. However, as this test is also sensitive to sample size, differences between models were only considered practically meaningful if  $\Delta\text{CFI} \geq 0.01$  (Cheung & Rensvold, 2002).

**Measure testing.** Next, the psychometric properties of the optimized 10-item measure were tested.

**Reliability.** To estimate internal consistency, Cronbach’s alpha was computed for the finalized subscales using the re-combined total sample. DeVellis (2012) and Rattray and Jones (2005) suggest an alpha value of 0.7 as a minimum for novel scales.

To assess the temporal stability of the ADES, test–retest coefficients (Pearson’s  $r$ ) were calculated in a convenience subsample consisting only of the university student cohort ( $n = 83$ ; see Table 1 for specific cohort demographics). A correlation coefficient exceeding 0.8 indicates good temporal stability, though all values exceeding 0.7 are considered useful (De Vriendt et al., 2011).

**Validation.** Evidence for construct validity was provided by demonstrating that the ADES (1) was associated with other measures designed to measure the same thing (convergent validity) and (2) related as expected with other measures of non-stress constructs (discriminant validity; Churchill, 1979).

As there is no existing measure of distress and eustress in adolescents, no scale reflects identical constructs to the ADES. The AES and the PSS-10 were consequently selected as convergent validity constructs, as their theoretical conceptualization of “stress” is the closest analogue to each of the ADES subscales. Validity coefficients (Pearson’s  $r$ ) were calculated between the ADES-E and the AES and the ADES-D and the PSS-10, with convergent validity determined by relatively strong positive correlations. However, according to Classical Test Theory, these correlations should not exceed  $\sqrt{\alpha}$  (DeVellis, 2006).

To examine discriminant validity, validity coefficients (Pearson’s  $r$ ) were calculated between the ADES and three related, non-stress constructs: personality, sense of coherence, and self-efficacy. These constructs were chosen as validation items as they (1) share significant conceptual and theoretical overlap and empirically demonstrated relationships with the stress response and (2) were considered key concepts associated with stress by the adolescent participants of the preliminary qualitative studies. Extant literature cites strong theoretical and empirical links between the stress response and both self-efficacy (e.g., Luszczynska et al., 2011; Nelson & Simmons, 2003) and sense of coherence



(e.g., Antonovsky, 1979; Moksnes et al., 2014), such that the constructs are negatively related to distress and positively related to eustress. Furthermore, each of the Big 5 personality traits were expected to relate to the stress response. Conscientiousness and Neuroticism share the greatest theoretical and conceptual overlap with stress, with the former being positively related with eustress (e.g., Rice, 1999; Saksvik & Hetland, 2011) and the latter with distress (e.g., B. D. Edwards, Franco-Watkins, Cullen, Howell, & Acuff, 2014; Saksvik & Hetland, 2011). Openness, Extraversion, and Agreeableness share little conceptual overlap with the stress response. In the sense that they broadly represent positive interactions with the world, these traits may relate positively to eustress and negatively to distress; however, these relationships were expected to be weak-to-negligible (Saksvik & Hetland, 2011). Appropriate discrimination was considered according to the traditional Campbell and Fiske (1959) cut-off, whereby a correlation less than 0.8 demonstrates evidence of discriminant validity.

**Measurement invariance.** Measurement invariance refers to the extent to which a scale performs equivalently across different groups of respondents. If measurement invariance is not established, one cannot decisively ascertain if score differences across groups reflect true construct difference between those groups or differences in the scale's performance across the groups (Cheung & Rensvold, 2002; DeVellis, 2006). As extant literature suggests that gender differences should be expected on ADES scores (e.g., Almeida & Kessler, 1998; Flook, 2011), the current study considered the measurement invariance of the ADES across gender groups via multi-group confirmatory factor analysis (MCFA). MCFA examines the changes in fit indices as increasingly restrictive cross-group constraints are progressively imposed on the measurement model (Brown, 2015; Cheung & Rensvold, 2002).

According to the recommendations of Vandenberg and Lance (2000), three increasingly restrictive models were iteratively examined to determine the degree of model invariance across genders. In the first model, only the measurement model pattern is constrained to be equal across groups (known as configural invariance), then the factor loadings (metric invariance), and finally the factor variances and covariance (variance-covariance invariance). As with regular CFA, meaningful model differences were considered at  $\Delta CFI \geq 0.01$  (Cheung & Rensvold, 2002).

## Results

### Measure Optimisation

Prior to performing EFA, two items were eliminated from the preliminary item pool for being strongly negatively skewed. No items were found to display inconsistent correlation patterns, share strong multicollinearity, or be overly influenced by social desirability bias.

Suitability of the remaining 48 items for EFA was established, with the Kaiser-Meyer-Olkin value (Kaiser, 1974) exceeding 0.6 ( $KMO = 0.95$ ) and the Bartlett's Test of Sphericity (Bartlett, 1954) reaching statistical significance. Data extraction revealed the presence of 7 factors with Eigenvalues greater than 1. The first two factors contained 44.9% of the total variance in the analysis (factor one and two accounted for 32.29% and 12.63% of variance respectively). The third factor accounted for 4.46% of the variance and each subsequent factor less than 3%. Inspection of the scree plot was inconclusive, suggesting either a two or three factor solution. Parallel analysis supported a three-factor solution, with three components with Eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix of the same size (50 variables, 491 respondents). To determine optimal factor structure, both the two- and three-factor solutions were examined. Comparing the factor loading tables, the two-factor solution resulted in stronger factor loadings and less cross-loadings. Given this comparison, the large differences between variance accounted for by factors one and two compared to factor three, and the increased interpretability and theoretical-alignment of a two-factor solution, subsequent EFA fixed the number of factors to two.

The items loading on the first factor were predominantly intended to measure distress, while the items loading on the second factor were predominantly intended to measure eustress. This indicated Factor 1 represents Distress, while Factor 2 represents Eustress. All items loaded on one factor  $\geq 0.32$ , establishing that they share more than 10% overlapping variance with other items in the factor.

Next, to produce a suitably parsimonious scale, item deletion occurred iteratively. Items with the lowest factor loadings were dropped in sequence until no item showed cross loading  $\geq 0.3$  and 5 items loaded on each factor  $\geq 0.5$  (Costello & Osborne, 2005). In addition, attention was paid to the theoretical alignment of items and the interpretability of the remaining items as a cohesive questionnaire.

The final factor solution after oblique rotation (see Table 2) accounted for 64.70% of the variance. The correlation between the factors was weak ( $r = -.32$ ), suggesting that the subscales serve as suitably independent dimensions.

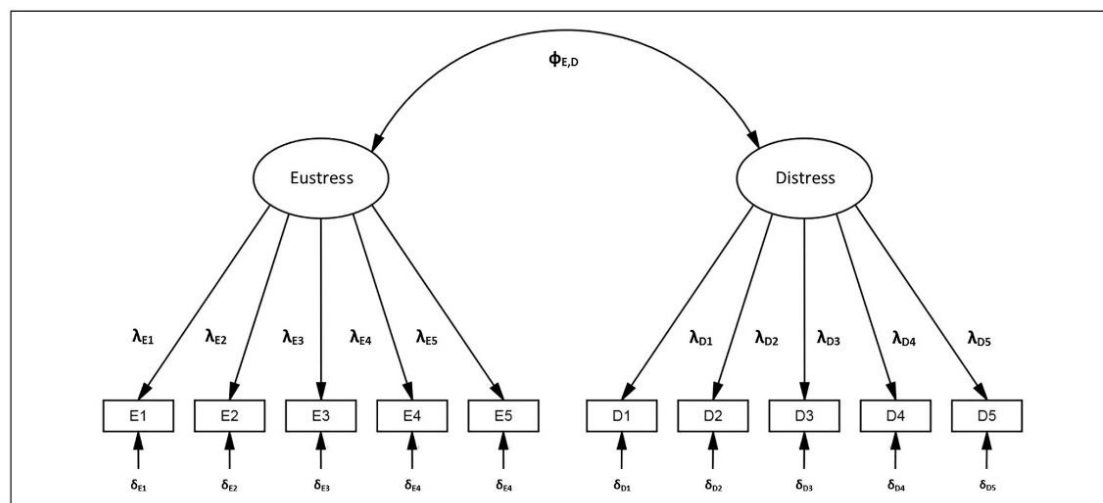
To confirm the 10-item, two-factor oblique structure found in EFA (see Figure 2), CFA was conducted using the cross-checking subsample. The two-factor model demonstrated acceptable model fit; Table 3 summarizes the latent factor loadings and fit indices. Furthermore, neither the one-factor nor the hierarchical model meaningfully improved data fit (Table 4). Together, these results support the two-factor oblique model found via EFA as the most appropriate design of the ADES.

**Final measure and instructions.** At the conclusion of the measure optimisation process, the ADES was finalized to consist of two correlated subscales each consisting of 5 items (see

**Table 2.** Pattern Matrix for EFA With Direct Oblim Rotation of the Final Two Factor Solution of the Retained Preliminary ADES Items.

Item	Factor	
	1	2
I felt anxious.	<b>.86</b>	.03
I felt overwhelmed.	<b>.79</b>	.02
I felt panicked.	<b>.78</b>	.05
I was frustrated with myself.	<b>.68</b>	-.02
My mind was racing out of control.	<b>.68</b>	-.12
I felt the outcome was worth the effort.	.04	<b>.78</b>
I felt determined.	.03	<b>.73</b>
I felt proud for dealing with the pressure.	-.13	<b>.72</b>
I felt motivated.	.09	<b>.70</b>
I was satisfied with how I dealt with the pressure.	-.12	<b>.66</b>

Note. Major loadings for each item are bolded. Factor correlation  $r = -.32$ . EFA = exploratory factor analysis; ADES = Adolescent Distress-Eustress Scale.

**Figure 2.** Two factor oblique model with 10 indicator items.

Note. See Table 3 for estimated confirmatory loadings, covariances, and model fit.

Table 5). The scale is evaluative rather than prescriptive, exclusively describing the adolescent stress response rather than offering any clinical or diagnostic criterion.

Table 6 displays the descriptive statistics for the ADES in the current sample.

### Measure Testing

Using the final 10-item scale, reliability, validity, and measurement invariance were evaluated.

**Reliability.** Estimates of internal consistency were computed for the finalized subscales using the re-combined total

sample. According to DeVellis's (2012) conventions, both subscales had very good reliability (ADES-D:  $\alpha = .87$ ; ADES-E:  $\alpha = .83$ ). The Follow up subsample completed the ADES a second time within 1 week of the initial questionnaire (mean number of days between Time 1 and Time 2 was 3.31,  $SD = 1.17$ ). Test-retest reliability was strong for both the distress subscale,  $r(81) = .86, p < .01$ , and the eustress subscale,  $r(81) = .81, p < .01$ , indicating good temporal stability of the ADES scores.

**Validity.** The ADES was appropriately correlated with the convergent validity scales. As expected, there were strong positive relationships between the ADES-E and the AES,

**Table 3.** Latent Factor Loadings and Fit Indices in CFA for the Final 10-Item Measure (See Figure 2 for the Estimated Model).

Factor/question		Estimates
<b>Eustress</b>		
<i>I felt motivated</i>	$\lambda_{E1}$	.77
<i>I felt the outcome was worth the effort</i>	$\lambda_{E2}$	.66
<i>I was satisfied with how I dealt with the pressure</i>	$\lambda_{E3}$	.62
<i>I felt determined</i>	$\lambda_{E4}$	.75
<i>I felt proud for dealing with the pressure</i>	$\lambda_{E5}$	.60
<b>Distress</b>		
<i>My mind was racing out of control</i>	$\lambda_{D1}$	.74
<i>I felt panicked</i>	$\lambda_{D2}$	.80
<i>I felt overwhelmed</i>	$\lambda_{D3}$	.79
<i>I felt anxious</i>	$\lambda_{D4}$	.76
<i>I was frustrated with myself</i>	$\lambda_{D5}$	.69
<b>Latent factor covariances</b>		
Distress~Eustress	$\Phi_{D,E}$	-.34
<b>Model Fit</b>		
RMSEA [90CI]		.07 [.06, .09]
CFI		.95
TLI		.94
$\chi^2$ (df)		123.41** (34)

Note. All estimates are standardized. CFA = confirmatory factor analysis; RMSEA = root mean square error of approximation; CI = confidence interval; CFI = comparative fit index; TLI = Tucker-Lewis Index.

\*\* $p < .01$ .

**Table 4.** Model Fit Statistics for a Two-Factor Model, One-Factor Model, and Second-Order Hierarchical Model of ADES Items.

Model	Comparison	$\chi^2$ (df)	RMSEA [90CI]	CFI	TLI	$\Delta\chi^2$ (df)	$\Delta$ CFI
1. Two-factor model		123.41** (34)	.07 [.06, .09]	.95	.94		
2. One-factor model	2-1	721.17** (35)	.20 [.19, .21]	.65	.55	597.76** (1)	-.30
3. Second-order hierarchical model	3-1	123.41** (34)	.07 [.06, .09]	.95	.94	N/A <sup>a</sup>	.00

Note. ADES = Adolescent Distress-Eustress Scale; RMSEA = root mean square error of approximation; CI = confidence interval; CFI = comparative fit index; TLI = Tucker-Lewis Index.

<sup>a</sup>Models 1 and 3 are equivalent and cannot be distinguished on statistical grounds; comparison must therefore be based on theory and interpretability.

\*\* $p < .01$ .

$r(874) = .60, p < .001$ , and between the ADES-D and the PSS-10,  $r(874) = .68, p < .001$ . Neither of these correlations exceeded  $\sqrt{\alpha}$  for their respective subscales (ADES-E = .91, ADES-D = .93). These results provide evidence for the convergent validity of the ADES. Table 7 summarizes the expected relationships between the ADES and the three individual difference variables (self-efficacy, sense of coherence, and personality), based on the direction and relative strength of the correlation. All correlations were below .80, providing evidence for discriminant validity and indicating that the ADES is sufficiently distinct from these related, non-stress constructs (Campbell & Fiske, 1959). Encouragingly, the ADES showed comparable or superior discriminant validity when compared to the existing stress measures (see Supplemental Table S-1 for correlations between the validation constructs and the PSS and AES).

In addition, the results generally adhered to the expected pattern of correlations, with some exceptions. As expected, the ADES subscales shared relatively stronger correlations with the more similar constructs of Self-Efficacy, SOC, Conscientiousness, and Neuroticism. While these relationships were in the direction predicted, the strength of the relationships between Eustress~Conscientiousness and Distress~Neuroticism were stronger than expected. However, as expected, the weakest and non-significant correlations are with the least similar variables: Openness, Agreeableness, and Extraversion.

**Measurement invariance.** While participants had the option to indicate "Other" when reporting gender, this group was too small in size ( $n = 7$ ) to include in the analysis. As such, only male and female participants were considered when

**Table 5.** Final 10-Item ADES Measure.

Item	Question
E1	I felt motivated.
D1	My mind was racing out of control.
E2	I felt the outcome was worth the effort.
E3	I was satisfied with how I dealt with the pressure.
D2	I felt panicked.
D3	I felt overwhelmed.
D4	I felt anxious.
E4	I felt determined.
E5	I felt proud for dealing with the pressure.
D5	I was frustrated with myself.

Note. Participants were given the following instructions: "These questions are about **how you respond to pressure**. Everybody responds to pressure differently at different times. Pressure can be good for you, bad for you, or a bit of both. For each item below, please choose the answer that best describes how you responded to pressure **in the last 7 days**." Each item is scored on a 5-point Likert-type scale; only the two extremes and the midpoint are labeled: *not like me* (0), *somewhat like me* (2), and *very much like me* (4). Scores are computed as the sum of the 5 corresponding items, and results presented separately across subscales: ADES-Distress = Sum(D1, D2,D3,D4,D5); ADES-Eustress = Sum(E1, E2,E3,E4,E5). ADES = Adolescent Distress-Eustress Scale.

**Table 6.** Descriptive Statistics of the ADES in the Current Sample ( $N = 981$ ).

	<i>M</i>	<i>SD</i>	Minimum	Maximum	Skewness	Kurtosis	Interquartile range
ADES-E	10.43	4.60	0.00	20.00	−0.11	−0.53	6.50
ADES-D	9.08	5.39	0.00	20.00	0.18	−0.88	8.00

Note. ADES subscale scores could theoretically range from 0 to 20, with higher scores indicating greater experience of that aspect of the stress response. ADES = Adolescent Distress-Eustress Scale.

evaluating the measurement invariance of the ADES across genders. MCFA results (Table 8) indicated that the measurement invariance constraints resulted in no substantial decrement in model fit, indicating that the ADES had appropriate equivalency across genders.

As measurement invariance was established, Hotelling's  $T^2$  was run to determine the effect of gender on the ADES (see Table 9 for descriptive statistics according to gender).

The differences between genders on the combined dependent variables was statistically significant,  $F(2, 971) = 51.14$ ,  $p < .001$ , Wilks'  $\lambda = .19$ , partial  $\eta^2 = .10$ . Using Bonferroni adjusted  $\alpha$  level of .025, post hoc testing showed females scored higher on the ADES-D ( $M_{\text{difference}} = 3.29$ , 95% CI [2.56, 4.03],  $p < .001$ ), but no statistically significant difference was found between genders for ADES-E scores ( $M_{\text{difference}} = .49$ , 95% CI [−1.15, 0.17],  $p = .10$ ).

## Discussion

The ADES was systematically developed and tested in a socio-educationally diverse sample of 981 adolescents. This scale was specifically designed for adolescent participants, with input from young people at every stage of item generation and scale refinement.

The first aim of the current study was to design the ADES from a collection of preliminary items. The scale was optimized using a pre-defined, iterative procedure incorporating item performance statistics and EFA. These results were then cross-checked in a separate subsample, with a two-factor oblique model supported as the most appropriate design of the ADES. The finalized scale consists of two 5-item subscales, which individually index distress and eustress. The two subscales were only weakly negatively correlated, suggesting that the scales are related, but suitably independent dimensions.

Initial psychometric properties for the ADES are promising. Addressing Aim 2, the internal reliability and temporal stability of both subscales was very good and exceeded the minimum requirements for a novel scale (DeVellis, 2012; DeVriendt et al., 2011; Rattray & Jones, 2005). Furthermore, results provided promising initial evidence for construct validity. Addressing Aim 3, the ADES was strongly correlated with established stress measures and related as expected with other non-stress constructs. Finally, in investigating Aim 4, the scale demonstrated measurement invariance across genders. This indicates the score differences found between males and females using the ADES may be interpreted to indicate true differences in the stress response,



**Table 7.** Evidence for Discriminant Validity: Predicted and Observed ADES Correlations With Individual Difference Variables.

	Expected pattern of results		Observed correlation	
	Distress	Eustress	Distress	Eustress
Self-efficacy	---	+++	-.39**	.46**
Sense of coherence	---	+++	-.53**	.40**
Personality				
Openness to experience	-	+	.02	.23**
Conscientiousness	--	++	-.19**	.48**
Extraversion	-	+	-.15**	.26**
Agreeableness	-	+	-.06	.25**
Neuroticism	++	--	.66**	-.31**

Note. Predictions are based on the expected pattern.— indicates a negative correlation is expected; + indicates a positive correlation is expected. Relative strength is indicated by the number of symbols. Listwise  $n = 876$ . ADES = Adolescent Distress-Eustress Scale.

\*\* $p < .01$ .

**Table 8.** Fit Indices and Difference Statistics for Measurement Invariance Models by Gender.

	Model description	Comparison	$\chi^2$ (df)	$\Delta\chi^2$ (df)	CFI	$\Delta$ CFI
1	Configural invariance <sup>a</sup>		237.82** (68)		.96	
2	Metric invariance <sup>b</sup>	2-1	245.63** (76)	7.81 (8)	.96	.00
3	Variance-Covariance invariance <sup>c</sup>	3-2	250.20** (79)	4.57 (3)	.96	.00

Note. CFI = comparative fit index.

<sup>a</sup>Measurement model pattern constrained across gender group.

<sup>b</sup>Model 1 + Factor loadings constrained across gender group.

<sup>c</sup>Model 2 + Variances and covariance between factors constrained to be equal across gender group.

\*\* $p < .01$ .

**Table 9.** Descriptive Statistics for the ADES According to Gender.

	ADES-E		ADES-D	
	M	SD	M	SD
Female <sup>a</sup>	10.19	4.54	10.67	5.21
Male <sup>b</sup>	10.68	4.65	7.38	5.02

Note. ADES subscale scores could theoretically range from 0 to 20, with higher scores indicating greater experience of that aspect of the stress response. ADES = Adolescent Distress-Eustress Scale.

<sup>a</sup> $n = 497$ .

<sup>b</sup> $n = 477$ .

rather than as artifacts of the scale's performance across groups. This is pertinent given the current female participants were found to have significantly higher ADES-D scores.

### Implications

The ADES is, to the best of our knowledge, the first measure that holistically takes into account both the positive and negative aspects of the adolescent stress response. As such, this measure serves to bridge the gap between theory and measurement, more appropriately reflecting the two-factor approach of prominent conceptualisations of stress (e.g.,

Lazarus & Folkman, 1984; Nelson & Simmons, 2003; Selye, 1974). Furthermore, by highlighting the positive aspects of stress, the ADES serves to counteract the negative-focus and provide a more balanced approach to stress research.

### Limitations and Future Research Directions

While the current results are promising, it is recognized that demonstrating the psychometric properties of a novel scale is an ongoing, cumulative effort (DeVellis, 2012). Several important considerations should be taken when interpreting the results of the present study.

**Restrictive sampling.** Attempts were made to avoid restricted sampling by considering both the size and the composition of the development sample (Cohen et al., 1983; DeVellis, 2012). However, the present sample was relatively homogeneous with regard to several demographic factors, most pertinently cultural and language diversity. In the current sample, 77.8% of participants exclusively spoke English at home, exceeding the national rate of 72.7% (Australian Bureau of Statistics, 2017). Furthermore, by sampling from exclusively educational contexts, adolescents in the workforce, vocational training, and those unengaged in any formal system were overlooked. In addition, all participants were volunteers and the majority required parental consent, likely leading to selection bias.

These issues of restrictive sampling were compounded in the examination of test–retest reliability. Given the pragmatic restrictions around collecting data in schools, the analysis was performed on a convenience subsample of only university students, leading it open to several limitations such as non-generalization and bias (De Vriendt et al., 2011). Furthermore, participant drop-out between initial and follow-up assessment was potentially selective. For example, participants may have dropped out due to higher levels of stress (Laferton, Stenzel, & Fischer, 2018).

Together these sampling limitations constrain the generalizability of the current results. Researchers utilizing the ADES should thus consider how their specific research situation differs from the current setting, how these differences may affect the validity of the scale, and the implications of this on the research conclusions (DeVellis, 2012). Future work, should look to reproduce the current findings in a broader, diverse, more generalisable sample. A further priority is to examine the psychometric properties of the ADES in specific populations, such as cross-cultural and Indigenous groups or in adolescents not engaged in the education system.

**Further validation work.** Validation of a scale is a long-term process (Peacock & Wong, 1990); the current study provides only initial support for construct validity and future research must examine a wider range of constructs. Furthermore, by only including one type of measurement method (self-report), the current study cannot account for common-method biases (Churchill, 1979), defined as “variance that is attributable to the measurement method rather than to the constructs the measures represent” (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003, p. 879). Further work should therefore look to determine the associations of the ADES with non-self-report measures of the same constructs, such as parent- or teacher-report scales.

**Influence of contextual factors.** As part of the development study, the current participants completed the scale together with all preliminary, subsequently discarded, items. This unique condition likely exerted an influence on pertinent

contextual factors, such as respondent fatigue, question order, and motivation, thereby effecting responses to the scale items (DeVellis, 2012). Replication of results utilizing only the finalized ADES is therefore necessary.

**Clinical cut-offs and norms.** As the ADES was developed as an exclusively descriptive tool, no specific clinical cut-offs or diagnostic criteria were established. Given then that the units of the ADES are arbitrary, individual scores viewed in isolation may not provide a researcher and/or clinician with adequate meaning. Future research could look to develop population norms, which would impute more meaning into individual scores (Churchill, 1979). Furthermore, researchers may look to develop threshold levels for intervention purposes. While not diagnostic criteria, such thresholds would identify individuals likely to benefit from intervention (Kern, Benson, Steinberg, & Steinberg, 2016).

## Conclusion

Limitations notwithstanding, the initial results presented here suggest the ADES as a brief, reliable, and psychometrically sound scale. Given the clarity and simplicity of both delivery and scoring, this self-report scale has the potential to meet the needs of researchers, schools, and other adolescent-focused organizations in the fields of both education and psychology. In conclusion, with replication in broader samples and further validation the ADES provides a promising tool for both theory and practice.

## Authors' Note

Prior Dissemination—some of the data from this paper was presented at 38<sup>th</sup> Stress and Anxiety Research Society Conference in Hong Kong (July 2017).

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## Supplemental Material

Supplemental material for this article is available online.

## Note

1. This modification utilizes the conservative boundary of 2.2 times the interquartile range.

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### Author Biographies

**Victoria Branson** is a PhD/master of Psychology (Clinical) candidate at the University of Adelaide. Her primary areas of research and clinical interest are in the promotion of healthy youth development and wellbeing and the application of Positive Psychology to educational settings.

**Matthew J. Dry** completed his PhD in Psychology in 2007 at the University of Adelaide. His research has focused on the mathematical modelling of cognitive and perceptual processes, psychopharmacology, and pedagogical research into tertiary education teaching and learning.

**Edward Palmer**, an associate professor publishes regularly in the field of technology in education in high quality journals. He has 20 years of experience in the design and evaluation of teaching initiatives and has played a key role in developing surveys and evaluation methodologies for national projects.

**Deborah Turnbull**, professor was awarded the chair in Psychology at the University of Adelaide in 2005 and has been researching in the area of health and clinical psychology for over 20 years. Turnbull's work has been published in high quality outlets including *The Lancet*, *International Journal of Behavioural Medicine*, and *Medical screening*. Her research group regularly presents at the peak international meeting relevant to her field, including the International Congress of Behavioural Medicine.

**Appendix I. Online Supplemental Material Paper 2: Discriminant Validity of  
Established Stress Scales**

The following table was submitted as online supplemental material for Paper 2  
(see Section 7.2).

Table 51

*Observed Correlations (Pearson's  $r$ ) Between Established Stress Measures and Individual  
Difference Variables*

	Perceived Stress	Academic Eustress
Self-Efficacy	-.53**	.54**
Sense of Coherence	-.68**	.35**
Openness	-.07	.23**
Conscientiousness	-.30**	.42**
Extraversion	-.17**	.22**
Agreeableness	-.17**	.17**
Neuroticism	.69**	-.36**

*Note.* Listwise  $n = 876$ .

\*\*  $p < .01$ .



**Appendix J. The Adolescent Distress-Eustress Scale Manual**

# **THE ADOLESCENT DISTRESS-EUSTRESS SCALE (ADES) MANUAL**

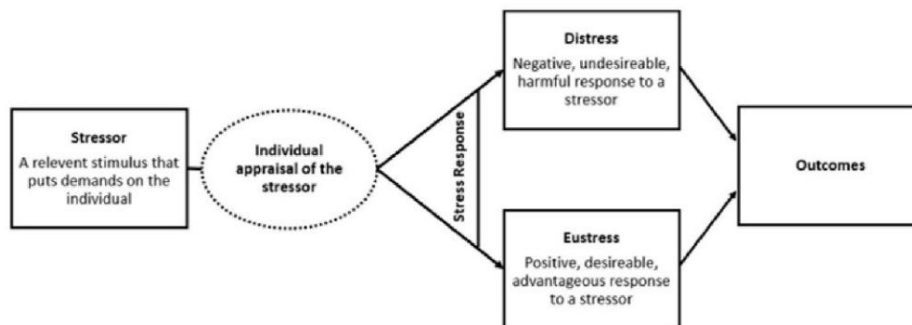
Branson, Dry, Palmer, and Turnbull (2019)

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### Defining Distress and Eustress

While lay understandings tend to conceptualise stress as dysfunctional and undesirable, psychological theory suggests stress is not intrinsically maladaptive. Prominent contemporary stress models, such as the Transactional Approach<sup>1</sup> and the Holistic Stress Model<sup>2</sup>, emphasise that stress can be both negative and positive. Synthesising across these theoretical conceptualisations, stress can be broadly defined as follows: 'Stress' is an individuals' response to a demanding stimulus, or 'stressor'. Stressors have no inherent valence, meaning an individual's experience of stress depends on their appraisal of that demand. The resultant response can be differentiated into distress, the negative, undesirable, and harmful response to a stressor, and eustress, the positive, desirable, and advantageous response to a stressor. These two responses are considered distinct constructs, rather than extremes on a continuum.



### The Adolescent Distress-Eustress Scale

The Adolescent Distress-Eustress Scale is used to operationalise the adolescent stress response. The 10-item measure consists of two subscales, which individually index distress (ADES-D) and eustress (ADES-E). See following page for the ADES Measure.

<sup>1</sup> Lazarus, R. S., & Folkman, S. (1984). Stress, appraisal, and coping. New York: Springer.

<sup>2</sup> Nelson, D. L., & Simmons, B. L. (2003). Health psychology and work stress: A more positive approach. In J. C. Quick & L. E. Tetrick (Eds.), Handbook of occupational health psychology (pp. 97-119). Washington, DC: American Psychological Association.



These questions are about **how you respond to pressure**.

Everybody responds to pressure differently at different times. Pressure can be good for you, bad for you, or a bit of both.

For each item below, please choose the answer that best describes how you responded to pressure **in the last 7 days**.

	Not like me		Somewhat like me		Very much like me
I felt motivated.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My mind was racing out of control.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt the outcome was worth the effort.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was satisfied with how I dealt with the pressure.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt panicked.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt overwhelmed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt anxious.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt determined.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt proud for dealing with the pressure.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was frustrated with myself.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Scoring<sup>3</sup>**

Each item is scored on a 5-point Likert-type scale; only the two extremes and the midpoint are labelled: Not like me [0], Somewhat like me [2], and Very much like me [4].

	Not like me	○	Somewhat like me	○	Very much like me
<i>E1</i> I felt motivated.	0	1	2	3	4
<i>D1</i> My mind was racing out of control.	0	1	2	3	4
<i>E2</i> I felt the outcome was worth the effort.	0	1	2	3	4
<i>E3</i> I was satisfied with how I dealt with the pressure.	0	1	2	3	4
<i>D2</i> I felt panicked.	0	1	2	3	4
<i>D3</i> I felt overwhelmed.	0	1	2	3	4
<i>D4</i> I felt anxious.	0	1	2	3	4
<i>E4</i> I felt determined.	0	1	2	3	4
<i>E5</i> I felt proud for dealing with the pressure.	0	1	2	3	4
<i>D5</i> I was frustrated with myself.	0	1	2	3	4

Scores are computed as the sum of the 5 corresponding items, and results presented separately across subscales:

- ADES-Distress = Sum(D1, D2, D3, D4, D5)
- ADES-Eustress = Sum(E1, E2, E3, E4, E5)

<sup>3</sup> An interactive Excel workbook for scoring and report writing is available on request; please use contact details on the final page of this manual.

### **Population**

The ADES is intended for respondents aged between 12 and 20 years.

### **Psychometric Properties**

In the development sample, the ADES showed good internal reliability (ADES-D:  $\alpha = .87$ ; ADES-E:  $\alpha = .83$ ) and temporal stability (ADES-D:  $r(81) = .86, p < .01$ ; ADES-E:  $r(81) = .81, p < .01$ ). Additionally, the scale demonstrated both convergent and discriminant validity, demonstrating strong correlations with established stress measures and being appropriately distinct from related, non-stress constructs including self-efficacy, sense of coherence, and the Big 5 personality traits. Strengthening evidence for construct validity, the direction and strength of correlations between these non-stress constructs and the ADES subscales were as expected based on past research and theory.

Subsequent to the initial development and validation, these psychometric properties have been replicated in additional samples.

#### *Validity Evidence Based on Clinical Groups*

In addition to correlations with other measure, the construct validity of the ADES is supported by its ability to distinguish individuals with clinically-significant psychological illbeing from non-clinical populations. Consistent with expectations, respondents with clinically-significant emotional disturbance ('Extremely Severe' Depression scores on the DASS21) displayed lower ADES-E scores and higher ADES-D scores than demographically-matched control groups.

### **Administration**

The ADES can be administered on paper or online (via methods such as SurveyMonkey, SurveryGizmo etc.).

When the ADES is administered, it is advisable to emphasise that:

- The questionnaire is not a test; there are no right or wrong answers
- Participants should consider *only* the previous 7 days
- Subscale scores require a response to all items

#### **Interpreting ADES Scores**

Toward the development of normative data, 1,431 participants completed the ADES online in May-August 2017 and April-July 2018. Goodness of fit tests indicated that the sample was broadly representative of the general Australian adolescent population in terms of key sociodemographic characteristics<sup>4</sup>. Descriptive statistics for the normative sample are as follows:

*Table. Means and Standard Deviations for the ADES in the normative sample*

		ADES-			
		ADES-Eustress		ADES-Distress	
	<i>n</i>	<i>M</i> [95CI]	<i>SD</i>	<i>M</i> [95CI]	<i>SD</i>
<b>Whole Sample</b>					
	1431	10.90 [10.67-11.13]	4.45	9.25 [8.97-9.53]	5.42
<b>Gender</b>					
Male	721	11.13 [10.81-11.46]	4.49	7.71 [7.34-8.08]	5.06
Female	710	10.67 [10.34-10.99]	4.41	10.82 [10.42-11.21]	5.32
<b>Age</b>					
Early Adolescence	591	10.93 [10.57-11.29]	4.44	8.27 [7.83-8.71]	5.44
Mid Adolescence	652	10.76 [10.41-11.11]	4.58	9.68 [9.27-10.09]	5.28
Late Adolescence	188	11.31 [10.73-11.89]	4.04	10.85 [10.09-11.60]	5.27
<b>Language Background</b>					
English	1054	10.81 [10.54-11.09]	4.52	9.31 [8.98-9.63]	5.44
Other	377	11.15 [10.72-11.59]	4.27	9.10 [8.56-9.64]	5.36

<sup>4</sup> *Note.* Sampling was restricted to adolescents within the educational system, with participants recruited from participating government, independent, and tertiary institutions. Test administrators should consider how their specific situation differs from the educational context, how these differences may affect the validity of the ADES and/or the utility of the normative data, and the implications of this on conclusions made using the scale

Utilising the normative data, the following table can be used to interpret raw ADES scores:

*Table. Interpreting ADES Scores: Percentile Ranks and Qualitative Descriptors*

ADES-Eustress			ADES-Distress		
Raw Score	Percentile Rank	Qualitative Descriptor	Raw Score	Percentile Rank	Qualitative Descriptor
0	1.19	Extremely Low	0	4.75	Extremely Low
1	2.03		1	7.48	Low
2	4.05		2	12.09	
3	5.94	Low	3	15.79	
4	9.43		4	21.66	Average
5	13.28		5	27.95	
6	17.47		6	34.94	
7	21.59	Average	7	41.37	
8	28.09		8	48.43	High
9	35.64		9	53.25	
10	46.40		10	60.38	
11	53.88		11	65.48	
12	62.19	High	12	70.51	
13	68.83		13	74.77	Extremely High
14	76.45		14	80.43	
15	84.21		15	84.07	
16	90.15	Extremely High	16	88.05	
17	94.27		17	91.33	
18	96.65		18	95.39	Extremely High
19	97.90	Extremely High	19	96.72	
20	100.00		20	100.00	

Additional gender- and age-stratified normative data are available from the authors on request (see contact details on final page).

Qualitative descriptors were assigned statistically as follows:

Extremely Low	< 5 <sup>th</sup> Percentile of the normative data
Low	5 <sup>th</sup> Percentile ≤ > 25 <sup>th</sup> Percentile of the normative data
Average	25 <sup>th</sup> Percentile ≤ > 75 <sup>th</sup> Percentile of the normative data
High	75 <sup>th</sup> Percentile ≤ > 95 <sup>th</sup> Percentile of the normative data
Extremely High	≥ 95 <sup>th</sup> Percentile of the normative data

The ADES is an evaluative measure, being designed to describe the adolescent stress response. Qualitative descriptors are to aid meaningful interpretation of ADES scores and do not offer any diagnostic criteria.

### Interpretation Examples

#### Ex. 1: Jane scored 17 on the Eustress Scale and 5 on the Distress Scale

Jane's Eustress score was in the High range and was equal to or above 94.3% of the normative sample. Another way to consider this score is that only 5.7% of the general adolescent population had a Eustress level above Jane.

Jane's Distress score was in the Average range and was equal to or above 28.0% of the normative sample. Another way to consider this score is that Jane had a Distress level below 72.0% of the general adolescent population.

#### Ex. 2: John scored 4 on the Eustress Scale and 20 on the Distress Scale

John's Eustress score was in the Low range and was equal to or above than only 9.4% of the normative sample. Another way to consider this score is that John had a Eustress level below 90.6% of the general adolescent population.

John scored the maximum possible Distress score, placing him in the Extremely High range.

Only 3.3% of the normative sample had a Distress level at this uppermost extreme.

**Use**

Please feel free to use the ADES in your research, school, or organisation; citation as follows:

Branson, V., Dry, M. J., Palmer, E., & Turnbull, D. (2019). The Adolescent Distress-Eustress Scale: Development and Validation. *SAGE Open*. <https://doi.org/10.1177/2158244019865802>

If you choose to use the ADES, we ask that you contact us using the details below to let us know how the measure performed:

**Victoria Branson**

[victoria.branson@adelaide.edu.au](mailto:victoria.branson@adelaide.edu.au)


c/o School of Psychology, The University of Adelaide

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## RESEARCH ARTICLE

WILEY

# A holistic understanding of the effect of stress on adolescent well-being: A conditional process analysis

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## Abstract

Although traditional assumptions tend to conceptualize stress as inherently dysfunctional, psychological theory suggests that it is not intrinsically maladaptive. Contemporary models emphasize that the stress response can be differentiated into both negative and positive aspects, known as distress and eustress. Research examining the differential effect of positive and negative stress on adolescent well-being is limited and has been hindered by a lack of appropriate measurement tools. The aim of the present study was to utilize the recently developed Adolescent Distress-Eustress Scale to provide a balanced understanding of the impact of stress on positive mental health, holistically considering the effect of both distress and eustress on adolescent well-being. One thousand eighty-one Australian adolescents ( $M_{age} = 15.14$ , 54.03% female) completed an online survey composed of the Adolescent Distress-Eustress Scale alongside measures of well-being, self-efficacy, psychological ill-being, physical activity, and daytime sleepiness. Conditional process analysis suggested that distress exerted no direct influence on well-being, with the observed negative relationship fully mediated by psychological and behavioural variables. Contrastingly, eustress was both directly related to increased well-being and exerted an indirect effect through relationships with mediating variables. These results demonstrate that stress can have profoundly positive consequences. Theoretical contributions, implications for practice, and perspectives for future research are discussed.

## KEYWORDS

adolescence, conditional process analysis, distress, eustress, well-being

## 1 | INTRODUCTION

Adolescence is characterized by an accumulation of demanding events, with young people facing numerous physical, environmental, and psychological changes (e.g., Moksnes, Løhre, Lillefjell, Byrne, & Haugan, 2014; Rudolph & Hammen, 1999). As such, adolescence can be a critically stressful period of the lifespan (Venning, Elliott, Kettler, & Wilson, 2013). Moreover, literature suggests that the adolescent brain is particularly sensitive to the effects of "stress" (e.g., Lupien, McEwen, Gunnar, & Heim, 2009).

The underlying assumption of much existing research is that stress is inherently dysfunctional, leading to profoundly negative psychological, behavioural, and physical consequences that can, at best, be mitigated by other factors (e.g., Aldwin & Stokols, 1988; Jones & Bright, 2001). On the basis of this inference, there are numerous therapeutic programmes designed for adolescents that seek to reduce stress as a method of increasing "well-being" (see, e.g., Felstead Education, 2019; Mental Health and Wellbeing Education and Training Providers, 2019). However, challenging this assumption, current theory suggests that stress is not intrinsically



maladaptive, and a growing body of empirical literature demonstrates that it can have desirable consequences (e.g., Boswell, Olson-Buchanan, & LePine, 2004; Kozusznik, Rodríguez, & Peiró, 2012). Interest in the positive aspect of stress has grown in the past two decades coinciding with the advent of positive psychology, which expands the traditionally deficit-focussed approach of stress research to highlight positive human assets (e.g., Seligman & Csikszentmihalyi, 2000).

Although theories differ in their specific conceptualization of the stress process, influential contemporary models, such as the holistic stress model (Nelson & Simmons, 2003) and the transactional approach (Lazarus & Folkman, 1984), emphasize that stress can be both positive and negative. Synthesizing across models, the current study adopts a partial-consensus definition, where stress is defined as an individual's subjective response to a demanding stimulus or "stressor." The resultant response, which is dependent upon individualized appraisal of the demand, can be differentiated into *distress*, the negative, undesirable, and harmful response to a stressor and *eustress*, the positive, desirable, and advantageous response to a stressor. The two responses are considered to be distinct constructs, rather than extremes on a continuum, suggesting that individuals can simultaneously experience *distress* and *eustress*.

Responding to demanding stressors is theorized to differentially impact on adolescents' psychological, behavioural, and physical health. It is well established in the literature that *distress* is adverse for mental health. Extensive previous research has found that *distress* incites and worsens a number of factors incongruous with well-being, including negative thoughts and hopelessness (e.g., Hughes, Gourley, Madson, & Le Blanc, 2011), exhaustion (e.g., Rice, 1999), alienation and withdrawal (e.g., Nelson & Simmons, 2003), and profoundly negative emotions (e.g., Parker & Ragsdale, 2015). In contrast, *eustress* has been found to elicit and promote factors conducive for improved well-being, such as motivation and improved cognitive and behavioural functioning (e.g., B. D. Edwards, Franco-Watkins, Cullen, Howell, & Acuff, 2014), focussed and enthusiastic engagement in activities (e.g., Nelson & Simmons, 2003), and far-reaching positive emotions (e.g., Parker & Ragsdale, 2015).

Empirically, several large cross-sectional studies of adults have found inverse relationships between the negative stress response and various aspects of well-being, including positive affect (Gloria, Faulk, & Steinhardt, 2013; Hargrove, Casper, & Quick, 2014); psychological well-being (Glozah & Pevalin, 2014; Hargrove et al., 2014); happiness (Parker & Ragsdale, 2015); meaningfulness (Parker & Ragsdale, 2015); job satisfaction and commitment (e.g., Quinones, Rodríguez-Carvajal, & Griffiths, 2016); and engagement (Kozusznik et al., 2012). Although the concept of "positive stress" has received markedly less research interest, selected cross-sectional studies report positive associations between *eustress* and quality of life (Babu et al., 2016); positive affect (Quick, Bennett, & Hargrove, 2014; Skinner & Brewer, 2002); psychological well-being (Hargrove et al., 2014); engagement (Kozusznik et al., 2012); job satisfaction

and commitment (e.g., González-Morales & Neves, 2015); and optimism (e.g., Nelson & Simmons, 2003). Experimental studies additionally suggest that participants manipulated to interpret stress positively experience greater positive emotion (Crum, Akinold, Martin, & Fath, 2017) and less emotional exhaustion (Strack & Esteves, 2015). Furthermore, a review concluded that *eustress* directly improved physiological functioning, rather than merely reducing harm (J. R. Edwards & Cooper, 1988).

As with much psychological literature, research into the effect of stress on positive psychological outcomes has been predominantly conducted in adult samples. Attempting to directly translate these results to adolescents discounts their unique developmental context (e.g., Compas, 1987). Of the literature focussing on young people, cross-sectional results suggest negative associations between negatively conceptualized stress and both life satisfaction (Carboni & Gilman, 2012; Chappel, Suldo, & Ogg, 2014; Newland et al., 2014; Noor & Alwi, 2013; O'Sullivan, 2011; Vera et al., 2012) and positive mental health (Anderson & Arnoult, 1989; Murdock, Gorman, & Robbins, 2015). Additionally, a longitudinal diary study found that lower same-day *distress* predicted greater happiness (Kiang & Buchanan, 2014). Contrastingly, cross-sectional studies of urban, ethnic minority adolescents found no unique relationship between *distress* and positive mental health constructs (Coyle & Vera, 2013; Vacek, Coyle, & Vera, 2010). Similarly, Kern, Benson, Steinberg, and Steinberg (2016) found only negligible, clinically meaningless, negative correlations between *distress* and well-being. Only three studies could be located examining the effect of positive stress on adolescents' psychological well-being. Of these studies, all of which were cross sectional and focussed exclusively on undergraduate students aged 17 to 20 years. *Eustress* was found to be weakly positively related to vigour, dedication (Mesurado, Richaud, & Mateo, 2015), and life satisfaction (O'Sullivan, 2011). Contrastingly, Anderson and Arnoult (1989) found no significant relationship between positive stress and psychological health.

Overall, the differential relationship between stress and positive adolescent mental health constructs is underresearched, and the existing results are varied. However, considering the theoretical arguments and limited empirical evidence, the following primary hypothesis was formulated:

**Hypothesis 1a.** Distress will be associated with decreased well-being.

**Hypothesis 1b.** Eustress will be associated with increased well-being.

## 1.1 | Factors influencing the effect of stress on well-being

As associations between variables are rarely as simple as bivariate relations, it is important to consider other factors influencing a relationship (e.g., Fairchild & MacKinnon, 2009; Hayes, 2017a). Currently,

there is little to no literature investigating the potential mechanisms and boundary conditions through which distress and eustress differentially effect well-being. With such a limited evidence base, the current study conjectures that gender, self-efficacy, psychological "ill-being," daytime sleepiness, and physical activity may be expected to influence the stress–well-being relationship given their established causal associations with both constructs.

### 1.1.1 | Psychological factors

Significant extant literature suggests that there are reciprocal causal influences between adolescent stress and both self-efficacy and ill-being. On one hand, if an individual responds positively to a stressor, their confidence in their ability to produce desired outcomes in the future is increased (Parker & Ragsdale, 2015; Quinones et al., 2016), and feelings of depression, anxiety, and general negative affect are decreased (e.g., Flook, 2011). In this way, eustress therefore promotes self-efficacy and decreases mental ill-being, and vice versa for distress. Reciprocally, confident, self-efficacious individuals are more likely to perceive stressors positively and focus on the opportunities associated with a stressor (Cicognani, 2011; Luszczynska, Piko, & Januszewicz, 2011), thereby promoting the eustress response and decreasing the distress response. Similarly, individuals with negative mood states are more likely to appraise stressors negatively than positively (e.g., Flook, 2011). Empirically, distress is ubiquitously associated with increased negative affect, depression, and anxiety (e.g., Kiang & Buchanan, 2014; Moksnes et al., 2014) and has been found to share a weak, negative trend towards self-efficacy (Branson, Dry, Palmer, & Turnbull, 2019; O'Sullivan, 2011). Although substantially less literature has examined the relationship between eustress and psychological variables, positively appraised stressors have been found to longitudinally predict decreased negative mood (Flook, 2011) and to share a positive relationship with self-efficacy (Mesurado et al., 2015; O'Sullivan, 2011).

Considering well-being, individuals with stronger self-efficacy and fewer symptoms of psychopathology and mental ill-being experience more positive psychological health (Lyubomirsky, King, & Diener, 2005). Empirically, interventions that increase self-efficacy precipitate improved well-being (Gibbons, Dempster, & Moutray, 2011), and cross-sectional studies of adolescents reveal positive associations between the two (Cicognani, 2011; Mesurado et al., 2015; O'Sullivan, 2011). With regard to ill-being, past psychological distress has been found to have a significant longitudinal effect on current well-being, but no support has been found for the reverse relationship (Lee & Oguzoglu, 2007), suggesting that although ill-being causally impacts on well-being, positive experiences are limited in their effect on psychological distress. Congruously, negative affect, depression, and anxiety are consistently associated with decreased well-being in cross-sectional studies of adolescents (e.g., Kern et al., 2016; Kiang & Buchanan, 2014; Vacek et al., 2010).

### 1.1.2 | Behavioural factors

Overall, eustress is suggested to promote positive health behaviour, whereas distress stimulates maladaptive behavioural responses (Glozah & Pevalin, 2014). Illustratively, stress differentially effects physical activity and sleep adequacy behaviours. Distress is associated with increased physiological arousal coupled with dysfunctional thoughts and worries, which together are incompatible with high-quality sleep (e.g., Sadeh, Keinan, & Daon, 2004). Consistently, distress has been found to be positively related to sleep disturbance in adolescents (Brand et al., 2014; Chung & Cheung, 2008). Additionally, distress is suggested to deplete an individual's energy resources, leading to subjective feelings of fatigue and tiredness (e.g., Parker & Ragsdale, 2015). Contrastingly, eustress has been argued to replenish energy resources, leading individuals to feel invigorated and energized (Parker & Ragsdale, 2015), states that seemingly preclude subjective feelings of sleepiness. Qualitatively, adolescents associate eustress with feelings of vitality and physical energy (Branson, Turnbull, Dry, & Palmer, 2019). In addition, responding to stressors also influences individuals' efforts to be physically active (Stults-Kolehmainen & Sinha, 2014). Distress has a significantly deleterious effect on physical health and motivation levels, which impair efforts to engage in physical activity (Stults-Kolehmainen & Sinha, 2014). Contrastingly, eustress is associated with factors that promote engagement with physical activity, including increased enthusiasm, engagement, and motivation (e.g., Nelson & Simmons, 2003), as well as the above-mentioned increases in physical energy. Empirically, adolescents experiencing greater distress have been found to be less physically active (Sevcikova et al., 2001); however, no research could be located examining the effect of eustress on physical activity levels.

Healthy lifestyle behaviours are reliably found to positively impact psychological well-being. Specifically, systematic reviews consistently conclude that physical activity is strongly associated with improvements in mental health across all age groups (Eime, Young, Harvey, Charity, & Payne, 2013; Salmon, 2001). Although the primary mechanism for this positive relationship relates to exercise-induced stimulation of neurotransmitters (Parfitt, Pavey, & Rowlands, 2009), it is suggested that physical activity has added benefits for adolescents by encouraging socialization and prosocial cooperative relationships (e.g., Donaldson & Ronan, 2006; Eime et al., 2013). Furthermore, insufficient sleep and related fatigue have been found to negatively impact on adolescent well-being (e.g., Brand et al., 2014; Parker & Ragsdale, 2015).

**Hypothesis 2.** Ill-being, self-efficacy, daytime sleepiness, and physical activity will mediate the relationship between the two stress responses and well-being.

2a. (a) Distress will be positively associated with ill-being and sleepiness and negatively associated with self-efficacy and physical activity. (b) Eustress will be negatively associated with ill-being and sleepiness and positively associated with self-efficacy and physical activity.



2b. (a) Ill-being and daytime sleepiness will be negatively associated with well-being. (b) Self-efficacy and physical activity will be positively associated with well-being.

### 1.1.3 | Gender

Literature suggests that the effect of stress on psychological and behavioural outcomes differs between genders (Compas, 1987; Newland et al., 2014), with females both exposed to more stressors and experiencing greater emotional reactivity to those stressors than males (e.g., Rose & Rudolph, 2006; Rudolph & Hammen, 1999). Biologically, males and females evidence differing sex-related hormonal and neurobiological responses to environmental threat (Verma, Balhara, & Gupta, 2011). In their seminal 2000 article, Taylor et al. (2000) argue that these differences evolved by virtue of traditionally disparate investment in caring for offspring and family, with females responding to threat by seeking and nurturing social contact ("tend-and-befriend" response), whereas males respond by fleeing or aggressing ("fight-or-flight" response). As with other theories based on evolutionary psychology, this model has been significantly criticized for promoting biological determinism (e.g., Eagly & Wood, 2013). Addressing these criticisms, peer socialization theories argue that the conventionally caring social roles of females require them to extend their concern to a wider range of people (Almeida & Kessler, 1998). This is particularly relevant for the current population, as research suggests that divergent gender roles and associated differences in responsibilities, status, and power intensify and solidify during adolescence (Chandra-Mouli et al., 2017; World Health Organization, 2002). In a critical review of the literature, Rose and Rudolph (2006) conclude that observed differences are best understood as an interaction of biological propensity and psychosocial vulnerability. Empirically, longitudinal studies have found that the relationships between stress and happiness (Kiang & Buchanan, 2014) and daily mood (Flook, 2011) are stronger for females than for males.

**Hypothesis 3.** The direct and indirect relationships between the two stress responses and well-being will be stronger in adolescents identifying as female than as male.

## 1.2 | Aims of the present study

Research into the differential effect of stress on adolescent well-being is limited and has been hindered by a lack of appropriate measurement tools. Despite prominent theoretical conceptualizations accepting eustress, the overwhelming majority of scales combines stress into a single dimension and focusses exclusively on what this paper defines as distress. As theory suggests that there should be opposite effects for the two stress responses, using such scales masks the true relationship between stress and well-being (e.g., Cavanaugh, Boswell, Roehling, & Boudreau, 2000).

The present study aims to utilize the recently developed Adolescent Distress-Eustress Scale (Branson, Dry, et al., 2019) to holistically consider both distress and eustress, providing a balanced understanding of the impact of stress on adolescent psychological health.

The overarching goal of the current investigation was therefore to comprehensively examine the effect of stress on adolescent well-being, establishing the mechanisms and contingencies by which these relationships operate. Synthesizing the three hypotheses outlined above, Figure 1 summarizes the predicted direct and indirect relationships between each stress response and well-being.

## 2 | METHOD

### 2.1 | Participants and procedure

Students from four educational institutions of varying socio-educational advantage were invited to take part in an online questionnaire. A total of 1,089 students accessed the survey (46.38% response rate), with 1,018 providing valid data. Of those students completing the questionnaire, 70.43% attended an independent private school ( $n = 717$ ), 19.65% attended a publicly funded government school ( $n = 200$ ), and 9.92% were undergraduate university students enrolled in first-year psychology courses ( $n = 101$ ). Participants' age ranged between 13 and 20<sup>1</sup> years, with a mean age of 15.14 ( $SD = 1.83$ ). Self-identified gender was reported as 54.03% female ( $n = 550$ ), 43.81% male ( $n = 446$ ), and 2.16% gender diverse ( $n = 22$ ). The sample was predominantly English speaking, with a significant minority (28%) speaking a language other than English at home.

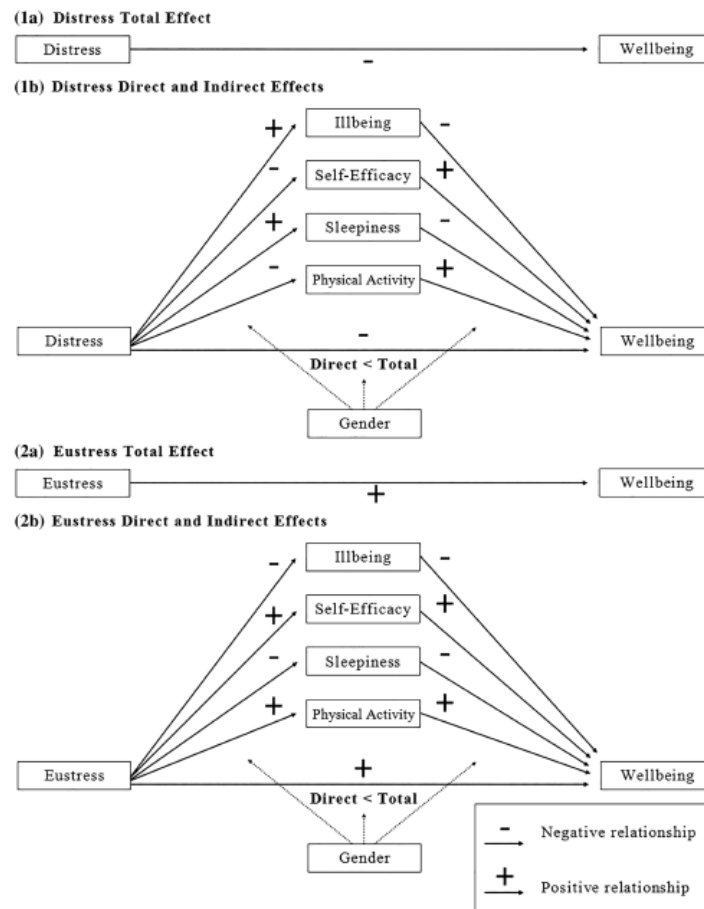
Ethical considerations emphasized informed consent, anonymity, confidentiality, and safeguarding of participants' emotional well-being. All procedures were approved by the University of Adelaide School of Psychology, Human Research Ethics Subcommittee (Code: 18-06), and the Department of Education and Child Development (Reference: 2018-0020).

### 2.2 | Measures

#### 2.2.1 | The Adolescent Distress-Eustress Scale

The 10-item Adolescent Distress-Eustress Scale (Branson, Dry, et al., 2019) consists of two subscales individually indexing distress and eustress. Each item (e.g., "I felt the outcome was worth the effort" and "I felt overwhelmed") is scored on a 5-point Likert-type scale, with responses ranging from 0 (*not like me*) to 4 (*very much like me*). Subscale scores are computed separately, with greater sum scores indicating greater experience of the applicable stress response. The Adolescent Distress-Eustress Scale subscales have demonstrated very good internal reliability (distress,  $\alpha = .87$ , and eustress,  $\alpha = .83$ ) and evidence of construct validity in a large sample of young people (Branson, Dry, et al., 2019).

**FIGURE 1** Overall conceptual diagrams for the hypothesized relationships between the adolescent stress responses and well-being, as mediated by ill-being, self-efficacy, sleepiness, and physical activity, and moderated by gender (Note. Gender was hypothesized to moderate all direct and indirect effects; however, the figure is simplified for clarity.)



## 2.2.2 | EPOCH measure of well-being

Well-being, defined as the combination of feeling good and functioning well (e.g., Huppert & So, 2013), was operationalized using the Kern et al. (2016) EPOCH model of well-being. This model, which adapts Seligman's (2011) seminal PERMA model to ensure appropriateness for adolescents, delineates well-being into (a) engagement: interest in and capacity to be absorbed by life activities; (b) perseverance: facility to pursue goals to completion; (c) optimism: confident and hopeful perspective; (d) connectedness: supportive, satisfying relationships; and (e) happiness: positive mood. Using this framework, the 20-item EPOCH measure of well-being (Kern et al., 2016) provides an overall measure of adolescent well-being. Each item (e.g., "I feel happy" and "I am optimistic about the future") is scored on a 5-point Likert-type scale, and subscale scores indexing the five well-being domains are computed as the average of the four corresponding items. Principal component analysis was used to identify the latent variable well-being from the five EPOCH elements, with total scores centred on 0 and higher scores indicating greater overall well-being. This scale has

demonstrated good internal consistency in large samples of adolescents, with subscale Cronbach's  $\alpha$  values ranging from .75 to .87 (Kern et al., 2016).

## 2.2.3 | DASS21

Ill-being<sup>3</sup> was operationalized using the depression and anxiety subscales of the 21-item DASS21 measure (Lovibond & Lovibond, 1995). Participants indicate the extent to which their experience corresponds with each statement (e.g., "I felt downhearted and blue" and "I felt scared without any good reason") on a 4-point Likert-type scale, ranging from 0 (*never*) to 3 (*almost always*), and sum scores are computed individually for depression and anxiety. Principal component analysis was used to identify the latent variable ill-being, with total scores centred on 0 and higher scores indicating greater overall ill-being. The DASS21 is considered valid for use in youths and demonstrated good internal consistency in a large representative sample of Australian adolescents (depression,  $\alpha = .88$ , and anxiety,  $\alpha = .79$ ; Tully, Zajac, & Venning, 2009).

### 2.2.4 | The General Self-Efficacy Scale

Self-efficacy was operationalized using the General Self-Efficacy Scale (Schwarzer & Jerusalem, 1995). Participants respond to each of the 10 items (e.g., "I can solve most problems if I invest the necessary effort") on a 4-point Likert-type scale ranging from 1 (*not at all true*) to 4 (*exactly true*), with a higher total sum score indicating greater overall perceived self-efficacy. The measure has demonstrated good internal reliability and evidence of validity in samples of young people (Schwarzer & Jerusalem, 1995).

### 2.2.5 | Cleveland Adolescent Sleepiness Questionnaire

The Cleveland Adolescent Sleepiness Questionnaire (Spilsbury, Drotar, Rosen, & Redline, 2007) was used to measure subjective daytime sleepiness. Participants indicate on a 5-point Likert-type scale how often each statement (e.g., "I fall asleep during my morning classes") applies to them, with responses ranging from 1 (*never*) to 5 (*almost every day*). Greater overall sum scores indicate greater daytime sleepiness. The adolescent-specific scale has demonstrated good psychometric properties, including good internal reliability and validity (see Lewandowski, Toliver-Sokol, & Palermo, 2011, for review).

### 2.2.6 | Physical Activity Questionnaire for Adolescents

Physical activity was defined as "any bodily movement produced by skeletal muscles that requires energy expenditure" (World Health Organization, 2015, para. 1) and operationalized using the Physical Activity Questionnaire for Adolescents (PAQ-A<sup>4</sup>; Kowalski, Crocker, & Donen, 2004). The PAQ-A captures activity levels in the previous week, with participants responding to the nine items (e.g., "In the last 7 days, on how many evenings did you do sports, dance, or play games in which you were very active") on a 5-point Likert-type scale. An overall summary score is calculated as the average of the first eight items, with higher scores indicating greater physical activity. The PAQ-A has demonstrated good psychometric properties, including good internal consistency and high convergent validity (e.g., Biddle, Gorely, Pearson, & Bull, 2011).

## 2.3 | Data analysis

Data were first screened for obviously frivolous responses (Fan et al., 2006), and outliers trimmed using the Hoaglin and Iglewicz (1987) labelling rule. Twenty-two participants were identified as gender diverse; the relatively small size of this group precluded meaningful inclusion in analysis, and these data were therefore excluded, and gender was treated dichotomously. To ensure appropriate models were utilized, mixed model analysis was used to explore possible clustering in well-being according to educational institution. After adjustment for age, there was no statistically significant

difference in well-being between the four participating institutions,  $F(3, 991) = 1.59$ ,  $p = .19$ , partial  $\eta^2 = 0.01$ , and as such, a single-level approach to analysis was taken. Preliminary analysis examined correlations among variables and gender differences in the data.

To test the hypothesized relationships (Figure 1), conditional process analysis (CPA) was conducted using the SPSS PROCESS macro (Hayes, 2017b). CPA integrates mediation and moderation models to examine the conditional nature of the mechanisms through which the independent variable transmits its effects to the outcome variable (Hayes, 2017a). This regression-based, path analytic approach uses bias-corrected bootstrap confidence intervals to test the significance of both direct and indirect effects and the influence of moderating variables on these effects. For the current study, this involved conducting moderated parallel mediation analyses to examine if the strength and/or direction of the direct and indirect effects of the stress responses on well-being differed between genders. As recommended by Hayes (2017a), when results indicated that gender was not a moderating factor, the model was modified, and follow-up mediation-only analysis was conducted using PROCESS. Bootstrapping of regression estimates was conducted with 50,000 samples and a 95% confidence interval, with an effect considered significant when the confidence interval did not include 0.

## 3 | RESULTS

### 3.1 | Preliminary analysis

Correlation analysis (Table 1) revealed that distress and eustress displayed an opposite pattern of relationships with the other variables. Distress shared a weak negative correlation with well-being, sharing 10.12% variance. Eustress shared a moderate positive relationship with well-being, sharing 41.85% variance.

Examining gender differences, females exhibited lower scores on eustress, self-efficacy, and physical activity and higher scores on distress, ill-being, and sleepiness than males (Table 2). Although no overall gender difference was found for total well-being, Hotelling's  $T^2$  was run to determine the effect of gender on the individual EPOCH domains. The differences between genders on the combined dependent variables were statistically significant,  $F(5, 990) = 11.40$ ,  $p < .001$ , Wilks'  $\lambda = 0.95$ , partial  $\eta^2 = 0.05$ . Post hoc analysis (Bonferroni-adjusted  $\alpha$  level of .01) showed that females exhibited significantly higher scores on connectedness than males (4.07 vs. 3.86, respectively,  $M_{\text{difference}} = 0.21$ ; 95% CI [0.10, 0.32],  $p < .001$ ), with no other significant gender differences evident.

### 3.2 | Gender-moderated parallel mediation

The moderated-mediation CPA results for the relationship between distress and well-being are provided in Table 3. Moderation of a direct effect is indicated when the interaction term created between the independent and moderator variable is a significant predictor of the outcome variable. As illustrated in Table 3, no interaction term significantly predicted any of the examined outcome variables, indicating



**TABLE 1** Internal reliability, descriptive statistics, and correlations of eustress (1), distress (2), well-being (3), ill-being (4), self-efficacy (5), sleepiness (6), and physical activity (7)

Variables	1	2	3	4	5	6	7
1. Eustress	1	-.39	.65	-.47	.50	-.33	.23
2. Distress		1	-.32	.63	-.38	.32	-.22
3. Well-being			1	-.52	.60	-.34	.23
4. Ill-being				1	-.45	.46	-.19
5. Self-efficacy					1	-.29	.14
6. Sleepiness						1	-.17
7. Physical activity							1
Valid N <sup>a</sup>	996	996	996	981	958	950	931
Cronbach's $\alpha$	.80	.88	.92	.92	.90	.87	.89
M	11.48	9.72	0.02 <sup>b</sup>	-0.01 <sup>b</sup>	29.80	37.69	2.50
SD	4.25	5.50	0.98	0.99	4.71	10.51	0.89

Note. All  $p$  values <.01.

<sup>a</sup>Cases excluded pairwise.

<sup>b</sup>Mean scores derived from principal component analysis are not equal to 0 due to the exclusion of gender-diverse participants.

**TABLE 2** Independent  $t$  tests for gender differences in eustress, distress, well-being, ill-being, self-efficacy, sleepiness, and physical activity

Variables	Male		Female		$M_{\text{difference}}$	$t$	$d$
	Valid $n$	$M$ (SD)	Valid $n$	$M$ (SD)			
Eustress	446	11.97 (4.15)	550	11.09 (4.29)	0.88	3.29**	0.21
Distress	446	7.94 (5.04)	550	11.16 (5.44)	-3.22	-9.70** <sup>a</sup>	0.61
Well-being	446	0.02 (0.94)	550	0.02 (1.01)	-0.00	-0.04 <sup>a</sup>	0.00
Ill-being	439	-0.22 (0.91)	542	0.16 (1.03)	-0.38	-6.14** <sup>a</sup>	0.39
Self-efficacy	431	30.55 (4.79)	527	29.18 (4.55)	1.37	4.54**	0.30
Sleepiness	429	35.12 (10.22)	521	39.80 (10.29)	-4.68	-7.01**	0.45
PA	421	2.70 (0.90)	510	2.33 (0.84)	0.37	6.44**	0.42

Abbreviation: PA, physical activity.

<sup>a</sup>Welch  $t$  test reported as Levene's test for equality of variance >0.05.

\*\* $p$  < .01.

that gender did not moderate any of the direct effects. Moderation of an indirect effect is indicated when the index of moderated mediation is significant. Results showed that all indices of moderated mediation were not significantly different from 0, suggesting that all indirect effects of distress on well-being were equivalent across males and females. Together, these results indicate that gender did not moderate either the direct or indirect effect of distress on well-being.

The moderated-mediation CPA results for the relationship between eustress and well-being are provided in Table 4. Significant interaction terms indicated that the relationships between eustress and both ill-being and physical activity were moderated by gender. Separately estimating the regression coefficients for these relationships in the two gender groups indicated that the negative relationship between eustress and ill-being was stronger in females ( $b$  (SE) = -0.12; 95% CI [-0.14, -0.10]) than in males ( $b$  (SE) = -0.08 (0.01); 95% CI [-0.10, -0.06]). Conversely, the positive relationship between eustress and physical activity was stronger for males ( $b$  (SE) = 0.06 (0.01); 95% CI [0.04, 0.08]) than for females ( $b$  (SE) = 0.03

(0.01); 95% CI [0.01, 0.05]). However, the nonsignificant indices of moderated mediation suggested that all indirect effects of eustress on well-being, including those transmitted via ill-being and physical activity, were equivalent across genders. Additionally, the eustress by gender interaction term did not significantly predict well-being, suggesting that gender did not moderate the direct relationship between eustress and well-being. Together, these results indicate that although gender did moderate some effects of eustress, it did not influence either its direct or indirect effect on well-being.

Overall, the results of the gender-moderated parallel mediation provided no support for the hypotheses that the direct and indirect relationships between each of the two stress responses and well-being would be stronger for females than for males.

### 3.3 | Gender-controlled parallel mediation

As results indicated that gender did not moderate the relationship between stress response and well-being, follow-up parallel mediation-

**TABLE 3** Conditional process analysis results for the relationship between distress and well-being, as mediated by ill-being, self-efficacy, sleepiness, and physical activity and moderated by gender

Outcome	Ill-being			Self-efficacy			Sleepiness			Physical activity			Well-being		
	<i>b</i> (SE)	LCI	UCI	<i>b</i> (SE)	LCI	UCI	<i>b</i> (SE)	LCI	UCI	<i>b</i> (SE)	LCI	UCI	<i>b</i> (SE)	LCI	UCI
Independent variable															
Distress	0.10 (0.01)	0.09	0.12	-0.36 (0.04)	-0.45	-0.28	0.50 (0.10)	0.60	0.69	-0.02 (0.01)	-0.04	-0.01	0.01 (0.01)	-0.01	0.02
Mediator variables															
Ill-being													-0.14 (0.04)	-0.22	-0.06
Self-efficacy													0.06 (0.01)	0.05	0.08
Sleepiness													-0.00 (0.00)	-0.01	0.00
PA													0.10 (0.04)	0.03	0.17
Moderator variable															
Gender	-0.16 (0.09)	-0.34	0.02	-1.09 (0.61)	-2.29	0.12	2.64 (1.40)	-0.13	5.41	-0.23 (0.12)	-0.46	-0.00	0.21 (0.48)	-0.74	1.15
Interaction terms															
Distress × gender													0.01 (0.01)	-0.01	0.03
Ill-being × gender													-0.07 (0.08)	-0.22	0.08
Self-efficacy × gender													0.01 (0.01)	-0.01	0.04
Sleepiness × gender													-0.00 (0.01)	-0.01	0.01
PA × gender													-0.08 (0.05)	-0.18	0.03
Index of moderated mediation															
Distress → ill-being → well-being													-0.01 (0.01)	-0.03	0.00
Distress → self-efficacy → well-being													0.00 (0.01)	-0.01	0.02
Distress → sleepiness → well-being													-0.00 (0.00)	-0.01	0.00
Distress → PA → well-being													0.00 (0.00)	-0.00	0.01

Note. Listwise  $N = 919$ . Significant results (i.e., the 95% confidence interval does not include 0) are shown in *italics*. Hypothesized relationships are presented in Model 1b, Figure 1.

Abbreviations: *b*, unstandardized regression coefficient; LCI, lower bound of 95% confidence interval for *b*; PA, physical activity; SE, standard error; UCI, upper bound of 95% confidence interval for *b*.

**TABLE 4** Conditional process analysis results for the relationship between eustress and well-being, as mediated by ill-being, self-efficacy, sleepiness, and physical activity and moderated by gender

Outcome	Ill-being			Self-efficacy			Sleepiness			Physical activity			Well-being		
	<i>b</i> (SE)	LCI	UCI	<i>b</i> (SE)	LCI	UCI	<i>b</i> (SE)	LCI	UCI	<i>b</i> (SE)	LCI	UCI	<i>b</i> (SE)	LCI	UCI
Independent variable															
Eustress	−0.08 (0.01)	−0.10	−0.06	0.51 (0.05)	0.41	0.61	−0.79 (0.12)	−1.03	−0.56	0.06 (0.01)	0.04	0.08	0.09 (0.01)	0.07	0.11
Mediator variables															
Ill-being													−0.22 (0.05)	−0.33	−0.12
Self-efficacy													0.09 (0.01)	0.07	0.10
Sleepiness													−0.01 (0.00)	−0.02	−0.00
PA													0.18 (0.04)	0.11	0.26
Moderator variable															
Gender	0.70 (0.18)	0.35	1.06	−1.84 (0.89)	−3.59	−0.09	4.01 (2.00)	0.14	7.96	0.01 (0.18)	−0.34	0.36	0.49 (0.39)	−0.29	1.26
Interaction terms															
Eustress × gender	−0.04 (0.01)	−0.06	−0.01	0.08 (0.07)	−0.06	0.22	0.00 (0.16)	−0.31	0.30	−0.03 (0.01)	−0.06	−0.00	−0.00 (0.01)	−0.03	0.02
Ill-being × gender													0.01 (0.06)	−0.12	0.13
Self-efficacy × gender													0.00 (0.01)	−0.02	0.03
Sleepiness × gender													−0.01 (0.00)	−0.02	0.00
PA × gender													−0.00 (0.05)	−0.10	0.10
Index of moderated mediation															
Eustress → ill-being → well-being													0.00 (0.01)	−0.01	0.02
Eustress → self-efficacy → well-being													0.01 (0.01)	−0.01	0.02
Eustress → sleepiness → well-being													0.01 (0.00)	−0.00	0.01
Eustress → PA → well-being													−0.00 (0.00)	−0.01	0.00

Note. Listwise  $N = 919$ . Significant results (ie, the 95% confidence interval does not include 0) are shown in *italics*. Hypothesized relationships are presented in Model 2b, Figure 1.

Abbreviations: *b*, unstandardized regression coefficient; LCI, lower bound of 95% confidence interval for *b*; PA, physical activity; SE, standard error; UCI, upper bound of 95% confidence interval for *b*.



only analysis was conducted. Given observed gender differences for both the independent and mediator variables, gender was designated as a covariate.

Table 5 summarizes results of the estimated parallel mediation model between distress and well-being. The total effects model explained 10.40% of the variation in well-being,  $F(2, 916) = 53.16$ ,  $R^2 = 0.10$ ,  $p < .01$ , with distress sharing a negative relationship with the outcome. The addition of the mediating variables explained an additional 35.62% of variation in well-being,  $F(6, 912) = 129.56$ ,  $R^2 = 0.46$ ,  $p < .01$ . The 95% confidence interval for the total indirect effect of distress on well-being did not contain 0 (95% CI  $[-0.08, -0.06]$ ), indicating that the effect was statistically significant. However, the regression coefficient for the direct relationship between distress and well-being was not statistically significant (95% CI  $[-0.00, 0.02]$ ). As expected, distress was positively associated with ill-being and sleepiness and negatively associated with self-efficacy and physical activity, and these conditions were accordingly related to decreased well-being. The indirect effects via ill-being and self-efficacy were relatively stronger than those through sleepiness and physical activity. Together, these results indicate that distress did not share a direct relationship with the outcome but was indirectly related to decreased well-being through its relationships with ill-being, self-efficacy, sleepiness, and physical activity.

Table 6 summarizes results of the estimated parallel mediation model between eustress and well-being. The total effects model explained 41.88% of the variation in well-being,  $F(2, 916) = 330.00$ ,  $R^2 = 0.42$ ,  $p < .01$ , with eustress sharing a positive relationship with the outcome. The addition of the mediating variables explained an additional 13.85% of variation in well-being,  $F(6, 912) = 191.36$ ,

$R^2 = 0.56$ ,  $p < .01$ . The regression coefficients for both the direct and total indirect relationship between eustress and well-being were statistically significant. As expected, eustress was negatively associated with ill-being and sleepiness and positively associated with self-efficacy and physical activity, and these conditions were accordingly related to increased well-being. The indirect effects via ill-being and self-efficacy were relatively stronger than those through sleepiness and physical activity. The direct effect accounted for 59.64% of the total effect. Together, these results indicate that increased eustress was directly related to increased well-being as well as exerting an indirect positive on the outcome through its relationships with ill-being, self-efficacy, sleepiness, and physical activity.

#### 4 | DISCUSSION

The present study represents the first holistic examination of effect of stress on adolescent well-being, extending prior research by utilizing a recently developed two-dimensional measure to consider the impact of both distress and eustress. Utilizing CPA, results work towards establishing the mechanisms and contingencies by which distress and eustress differentially impact on adolescent well-being.

Consistent with theoretical arguments and the limited empirical evidence (e.g., Kiang & Buchanan, 2014; Mesurado et al., 2015; Newland et al., 2014; O'Sullivan, 2011), distress shared a weak negative relationship with adolescent well-being, whereas eustress shared a moderate positive relationship with the outcome. CPA results indicated that the relationship between distress and well-being was fully mediated by ill-being, sleepiness, self-efficacy, and physical activity, suggesting that decreased distress enhanced factors

**TABLE 5** Total, direct, and indirect effects of distress on well-being, as mediated by ill-being, self-efficacy, sleepiness, and physical activity, and controlling for gender

Effect	<i>b</i> (SE)	LCI	UCI	$\beta$
Distress → ill-being	0.11 (0.01)	0.10	0.12	.63
Distress → self-efficacy	-0.32 (0.03)	-0.37	-0.26	-.37
Distress → sleepiness	0.52 (0.07)	0.39	0.65	.27
Distress → physical activity	-0.03 (0.01)	-0.04	-0.01	-.16
Ill-being → well-being	-0.26 (0.04)	-0.34	-0.19	-.27
Self-efficacy → well-being	0.09 (0.01)	0.08	0.11	.46
Sleepiness → well-being	-0.01 (0.00)	-0.02	-0.01	-.12
Physical activity → well-being	0.15 (0.03)	0.09	0.20	.14
Total effect distress → well-being	-0.06 (0.01)	-0.07	-0.05	-.34
Direct effect distress → well-being	0.01 (0.01)	-0.00	0.02	.06
Distress → ill-being → well-being	-0.03 (0.00)	-0.04	-0.02	-.17
Distress → self-efficacy → well-being	-0.03 (0.00)	-0.04	-0.02	-.17
Distress → sleepiness → well-being	-0.01 (0.00)	-0.01	-0.00	-.03
Distress → physical activity → well-being	-0.00 (0.00)	-0.01	-0.00	-.02
Total indirect effects distress → well-being	-0.07 (0.01)	-0.08	-0.06	-.40

Note. Listwise  $N = 919$ .

Abbreviations: *b*, unstandardized regression coefficient;  $\beta$ , standardized regression coefficient; LCI, lower bound of 95% confidence interval for *b*; SE, standard error; UCI, upper bound of 95% confidence interval for *b*.

**TABLE 6** Total, direct, and indirect effects of eustress on well-being, as mediated by ill-being, self-efficacy, sleepiness, and physical activity, and controlling for gender

Effect	<i>b</i> (SE)	LCI	UCI	$\beta$
Eustress → ill-being	−0.10 (0.01)	−0.12	−0.09	−.45
Eustress → self-efficacy	0.56 (0.03)	0.49	0.62	.49
Eustress → sleepiness	−0.79 (0.08)	−0.94	−0.64	−.31
Eustress → physical activity	0.04 (0.01)	0.03	0.06	.19
Ill-being → well-being	−0.14 (0.03)	−0.20	−0.08	−.14
Self-efficacy → well-being	0.06 (0.01)	0.05	0.08	.32
Sleepiness → well-being	−0.01 (0.00)	−0.01	−0.00	−.08
Physical activity → well-being	0.10 (0.02)	0.05	0.14	.09
Total effect eustress → well-being	0.15 (0.01)	0.14	0.16	.65
Direct effect eustress → well-being	0.09 (0.01)	0.08	0.10	.39
Eustress → ill-being → well-being	0.01 (0.00)	0.01	0.02	.06
Eustress → self-efficacy → well-being	0.04 (0.00)	0.03	0.04	.16
Eustress → sleepiness → well-being	0.01 (0.00)	0.00	0.01	.02
Eustress → physical activity → well-being	0.00 (0.00)	0.00	0.01	.02
Total indirect effects eustress → well-being	0.06 (0.01)	0.05	0.07	.26

Note. Listwise  $N = 919$ .

Abbreviations: *b*, unstandardized regression coefficient;  $\beta$ , standardized regression coefficient; LCI, lower bound of 95% confidence interval for *b*; SE, standard error; UCI, upper bound of 95% confidence interval for *b*.

associated with positive mental health but did not exert a direct influence on the outcome. Contrastingly, increased eustress both created a context of well-being enhancing psychological and behavioural factors and exerted a direct influence on adolescent well-being. Moreover, of all predicting variables, eustress exerted the strongest influence on well-being, with the direct relationship accounting to 59.64% of the total effect. Together, these results suggest that whereas distress and the psychological and behavioural mediating variables significantly impacted on the outcome, eustress was the most strongly influential factor contributing to adolescent well-being.

Current results did not support the prediction that the relationships between stress and well-being would be stronger for females than for males, with no evidence for gender moderation. Although the present study is the first to explicitly investigate the moderating influence of gender on the relationships between distress, eustress, and well-being, these results are seemingly inconsistent with literature suggesting that adolescent girls are more sensitive to the effects of stress than boys (e.g., Flook, 2011; Kiang & Buchanan, 2014). However, although not found to be a moderating factor, large, clinically meaningful gender differences were observed for the majority of examined variables, with females exhibiting lower scores on eustress, self-efficacy, and physical activity and higher scores on distress, ill-being, and sleepiness than males. This is consistent with a large body of literature suggesting that adolescent females tend towards poorer psychological and behavioural health, exhibiting greater negative reactivity to stressors (e.g., Rose & Rudolph, 2006; Rudolph & Hammen, 1999); higher rates of internalizing problems (e.g., Lupien et al., 2009; Tully, Zajac, Venning, & A. J., 2009); reduced self-efficacy

(e.g., Bergman & Scott, 2001; Frydenberg, 2011); lower participation in physical activity (e.g., Van Der Horst, Paw, Twisk, & Van Mechelen, 2007); and greater daytime sleepiness (e.g., Spilsbury et al., 2007). As discussed in Section 1, these differences are likely explained by a combination of biological factors and the psychosocial influence of differing gender roles (e.g., Rose & Rudolph, 2006).

Observed gender differences indicate that females exhibited poorer scores on all variables associated with lowered well-being; however, results revealed no overall difference on total well-being scores across genders. Several possible explanations are offered for this seemingly conflicting finding. First, examining gender differences across the five constituent EPOCH well-being domains suggested that females' total well-being scores may have been biased upwards by significantly higher scores on connectedness. Qualitatively, if total well-being scores were calculated excluding the connectedness domain, female well-being scores would be meaningfully lower than males. These observed differences are cogent with literature suggesting that although females trend towards lower well-being domain scores, they receive higher levels of many emotional provisions in their friendships (e.g., closeness, trust, and nurturance; see Rose & Rudolph, 2006, for a review) and thus experience significantly higher connectedness scores (Kem et al., 2016). This result may also be interpreted in relation to Taylor et al.'s (2000) tend-and-befriend theory, which posits that females' response to threat is characterized by a pattern of affiliation with social groups. Perhaps, in response to the observed poorer psychological and behavioural health discussed above, females responded by nurturing supportive relationships and therefore had heightened connectedness scores. Second, the current study may have failed to include an important, gender-specific,

protective variable. For example, it is commonly accepted that females are less prone to externalizing behaviours, such as aggression, antisocial behaviour, and substance abuse, all of which are associated with decreased well-being (Rosenfield & Mouzon, 2013). Without a measure of externalizing, the negative influence of such behaviours on male well-being may be unrecognized in the present study. Finally, research suggests that observed gender differences are often confounded by reporting bias, with boys less inclined to report negative emotions (Vacek et al., 2010). Teasing these issues apart offers perspectives for further research.

Overall, results challenge the common assumption that stress is inherently dysfunctional, demonstrating that stress can have desirable consequences for positive adolescent mental health. By holistically considering both distress and eustress, the present study contributes to theory by providing a balanced understanding of the differential effect of stress on adolescent's psychological health. Further, results offer implications for practice, discussed below.

#### 4.1 | Practical implications

In addition to the intrinsic value of feeling good and functioning well, adolescent well-being is associated with numerous advantageous secondary outcomes, including social and academic success, improved physical health, and reduced mental illness and psychopathology (e.g., Huppert, 2009; Kern et al., 2016; Lyubomirsky et al., 2005). There are thus potentially far-reaching and broad-spectrum benefits in seeking to foster and enhance adolescent well-being through intervention. Importantly, focussing on well-being early in life is argued to "develop a young person's psychological strengths and lay the foundations of a sustained healthy life in adulthood" (Venning et al., 2013, p. 34). Understanding the accessible and modifiable causes of well-being in adolescents is fundamental in providing effective, evidence-based interventions.

On the basis of the common assumption that stress is intrinsically maladaptive, numerous therapeutic programmes seek to reduce stress as a method of increasing adolescents' well-being (e.g., Felstead Education, 2019; Mental Health and Wellbeing Education and Training Providers, 2019). However, the current study provides a more nuanced reference on stress and therapeutic intervention for the improvement of adolescents' mental health. Results suggest that contrary to traditional assumptions, holistic stress management interventions are required that recognize that response to demands can be positive as well as negative (Nelson & Simmons, 2003). Moreover, given the relative strength of their impact on well-being, results suggest that although distress reduction is valuable, intervention should strongly focus on generating and reinforcing eustress.

In practice, professionals working with young people should acknowledge that stress is not always associated with unfavourable outcomes and aim to identify which aspects of life adolescents consider "eustressful" and why and then seek to reinforce these elements (Hargrove, Nelson, & Cooper, 2013; McGowan, Gardner, & Fletcher, 2006). Interventions that fail to differentiate between the dimensions of stress in this way may unintentionally remove the

experience of stress that enhances well-being (Boswell et al., 2004). Additionally, although the present study found no evidence of a moderating effect of gender, female-specific interventions may be warranted on the basis that results indicated that girls may be particularly vulnerable to poor psychological health during adolescence. Future research should seek to determine the mode and content of intervention that are most likely to reinforce and generate eustress in adolescents.

#### 4.2 | Strengths, limitations, and future directions

The current study has severable notable strengths, including its novelty, comprehensive and detailed analysis procedure, and the use of a large, socio-educationally diverse sample. However, these findings should be interpreted with the following important considerations in mind.

First, the cross-sectional design of the study constrains conclusions regarding causation. Mediation is a causal model that assumes that the independent variable produces change in the mediating variable, which in turn leads to change in the outcome variable. Despite the extensive extant literature cited in Section 1 establishing the theoretical and empirical argument for the causal links hypothesized, strict causal ordering cannot be statistically established using the current cross-sectional data. Acknowledging this constraint, Hayes (2017a) argues that cross-sectional CPA is crucial in determining whether variables relate with each other as would be expected if mediation did exist and therefore in demonstrating that data are consistent with hypothesized causal ordering. However, it will be important for future research to replicate and extend the results of the present study using longitudinal or experimental data.

Second, investigation of gender differences in the stress-well-being relationship was limited by the exclusion of gender-diverse participants. Qualitatively examining the descriptive statistics of the gender-diverse participants suggests that they experienced poorer mental health than male or female participants, including substantially higher ill-being and lower well-being (see Figures S1 and S2). These observations are consistent with a vast and growing body of literature suggesting that gender-diverse and transgender people are substantially more likely to experience mental health disorders and report suicidal and self-harm ideation (e.g., Hyde et al., 2014). Future research may look to consider the effect of stress on well-being in gender-diverse adolescents.

Finally, the current study was pragmatically bound in terms of the number of variables collected. The included psychological and behavioural factors were selected based on the strength of empirical and theoretical support for their relationships with stress and well-being as well as their clear potential importance. However, the literature suggests that further sophistication of the conditional process model could be achieved through consideration of the mediating influence of diet (Austin, Smith, & Patterson, 2009), social support (Glozah & Pevalin, 2014), and self-esteem (Lyubomirsky et al., 2005) and the moderating influence of personality (Huppert, 2009; Kung & Chan, 2014) and socio-economic status (Huppert, 2009;



Newland et al., 2014). Selected research also suggests that the proportion of positive to negative stress is important in predicting well-being (Flook, 2011; Kozusznik et al., 2012); future studies may look to include such a ratio in analysis.

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## CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

## PRIOR DISSEMINATION

Some of the data from this paper were presented at the Positive Education Schools Association South Australian Chapter State Conference in Adelaide, Australia (March 2019).

## DATA ACCESSIBILITY STATEMENT

The data used in this research were collected subject to the informed consent of the participants. In line with this consent, access to data is available only on request; please contact the last author at [deborah.turnbull@adelaide.edu.au](mailto:deborah.turnbull@adelaide.edu.au). Requests will be considered in consultation with the University of Adelaide, School of Psychology Research Committee and Human Research Ethics Subcommittee.

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## ENDNOTES

<sup>1</sup> For the purposes of the current paper, "adolescence" is defined as the ages 12–20, aligning with the South Australian Mental Health Survey (Venning et al., 2013). However, ethical considerations precluded the inclusion of 12 year olds in the current sample.

<sup>3</sup> The term "ill-being" is preferred over "mental illness" as the DASS21 evaluates respondents' negative emotional states along a continuum, rather than being categorical or diagnostic.

<sup>4</sup> Items were adapted to suit Australian participants, with approval from the measure's author.

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## SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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**Appendix L. Principal Components Analysis Extracting Wellbeing and Illbeing for  
Paper 3 (Chapter 8)**

Principal component analysis (PCA) was used to identify the latent variables of 'Wellbeing' from the five EPOCH elements and 'Illbeing' from the Depression and Anxiety items of the DASS21. PCA is more robust than using the mean of the measure subscales and avoids problems of multicollinearity. As such, the principal component found can be used in multiple linear regression in place of the original variables (Jolliffe, 2005). Data were extracted using an oblique direct oblim rotation ( $\Delta = 0$ ). Variables were operationalised using extracted regression factor scores.

**Wellbeing**

Suitability of the EPOCH subscale scores for PCA was established, with the Kaiser-Meyer-Olkin value (Kaiser, 1974) exceeding 0.6 ( $KMO = .82$ ) and the Bartlett's Test of Sphericity (M. S. Bartlett, 1954) reaching statistical significance. Data extraction revealed the presence of one component with an Eigenvalues greater than 1; inspection of the scree plot likewise suggested a one-component solution. Component 1 (renamed 'Wellbeing') explained 60.79% of variance in the five wellbeing dimensions. The PCA component matrix is presented in Table 52.

Table 52

*Principal Component Analysis: Wellbeing*

	Component 1
Engagement	.85
Perseverance	.85
Optimism	.75
Connectedness	.73
Happiness	.71



## Illbeing

Suitability of the Depression and Anxiety items of the DASS21 for PCA was established, with the Kaiser-Meyer-Olkin value (Kaiser, 1974) exceeding 0.6 (KMO = .95) and the Bartlett's Test of Sphericity (M. S. Bartlett, 1954) reaching statistical significance. Data extraction revealed the presence of 2 components with an Eigenvalues greater than 1. The first component contained 50.65% of the variance in analysis, with Component 2 accounting for only 8.30% additional variance. Inspection of the scree plot suggested a one-component solution. The PCA component matrix is presented in Table 53.

Table 53

### *Principal Component Analysis: Illbeing*

	Component 1
Anxiety Item 1	0.46
Anxiety Item 2	0.69
Anxiety Item 3	0.69
Anxiety Item 4	0.66
Anxiety Item 5	0.78
Anxiety Item 6	0.68
Anxiety Item 7	0.75
Depression Item 1	0.73
Depression Item 2	0.59
Depression Item 3	0.77
Depression Item 4	0.79
Depression Item 5	0.76
Depression Item 6	0.81
Depression Item 7	0.75

## Appendix M. Online Supplemental Material Paper 3: Descriptive Statistics for Gender-Diverse Participants

While the relatively small number of participants identifying as gender diverse precluded their meaningful inclusion in statistical analysis, qualitatively examining descriptive statistics (Table 54) for the gender diverse group suggests these participants' experienced substantially higher illbeing (Figure 27) and lower wellbeing (Figure 28) than male and female participants. These tables and figures were submitted as online supplemental material for Paper 3, see Section 8.3.

*Table 54*

Descriptive Statistics for Wellbeing and Illbeing According to Gender

	Male			Female			Gender-Diverse		
	Valid <i>n</i>	<i>M</i>	<i>SD</i>	Valid <i>n</i>	<i>M</i>	<i>SD</i>	Valid <i>n</i>	<i>M</i>	<i>SD</i>
Illbeing	439	-0.22	0.91	542	0.16	1.03	21	0.70	1.11
Wellbeing	446	0.02	0.94	550	0.02	1.03	22	-1.01	1.31

*Note.* Cases excluded pairwise.

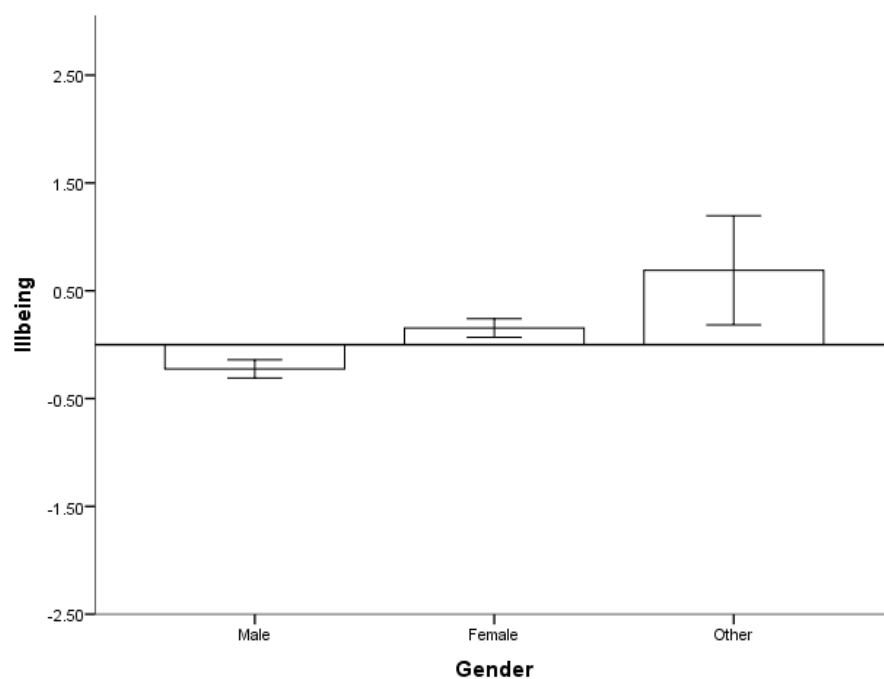


Figure 27. Mean illbeing by gender, where higher values indicate higher illbeing. Error bars represent the 95% confidence interval around the mean.

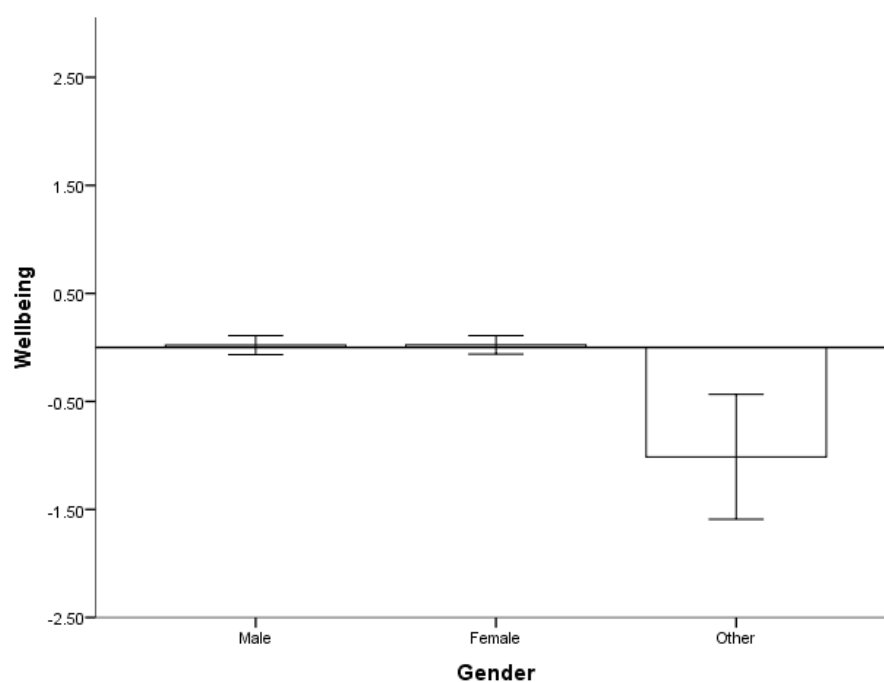


Figure 28. Mean wellbeing by gender, where higher values indicate higher wellbeing. Error bars represent the 95% confidence interval around the mean.

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